RECONDITIONING COOKERS

The ELECTRICAL REVIEW

FOUNDED 1872

VOL. CXVII
No. 3013

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Solution of a Hired Cooker Problem

WITH ordinary use an electric cooker of a reputable make will give good service for many years. In approving loans for the purpose of purchasing cookers (under the general heading of "consumers' apparatus") the Electricity Commissioners allow a repayment period of seven years, but this, as in the case of loans for power plant and cables, is conservative, and the actual life of the equipment should be much longer.

A great deal, of course, depends upon the maintenance service, and it can be assumed that in their own interests, if not in their consumers', electricity supply undertakings generally will make reasonable efforts to keep the cookers on their mains in good order.

But alas! the life and operation of cookers are not the only concern of the housewife. She wants her kitchen to be smartly as well as efficiently equipped, and when the cooker's original beauty has faded she begins to feel unhappy about it.

If the cooker is her own property she takes a pride in keeping it in good condition, but if she fails she consoles herself with the thought that when she can afford it she will get a new one; in the meantime she makes the best of the one she has. Should she be acquiring the appliance under a hire-purchase system she may take up the same philosophical attitude, but with rather more reluctance. She will feel that by the time the cooker is paid for it will be due for replacement.

It is possible that in such circumstances she may be willing to pay a reasonable sum for its renovation. And the supply undertaking may possibly be willing to do the job and spread the charges over three or four quarters if necessary.

But it is when we come to cookers let out on simple hire that the main problem for the supply authority arises. In such schemes it is customary to secure an undertaking from the consumer to retain the cooker for a given period, but it is impracticable to make this period anything like the useful life of the cooker.

Consumers will be reluctant to tie themselves down for more than two or three years, and when their legal obligation ceases few of them will feel morally bound to keep a soiled cooker if by threatening to revert to gas they can coerce the supply authority to change it for a new one, or at least to make the existing one "as good as new."

It would thus seem that any scheme for the simple hire of cookers must take this into consideration. By some means or other cookers must be renovated so that consumers will continue to use them until the end of their useful life, or until they become hopelessly out of date—which is not likely to happen with modern types.

There are firms which will undertake such work, but the experience of the Eastbourne Electricity Dept. has proved that the cost is high while the results are not always satisfactory. And so it becomes necessary for the authority to consider doing the work itself. In his article in this issue Mr. P. W. Bignell, of Eastbourne, relates what his department has accomplished.

We think that a statement of what this undertaking is doing will be very useful to other supply authorities which are faced with the necessity of reconditioning hired appliances. Mr. Bignell's article is eminently practical and indicates a willingness to share experience which is not too common in our industry.

American Electrical Movement

THE reports of recovery in the United States seem to be something more than the wish being father to the thought, at any rate, so far as the electrical industry is concerned. Experience must needs put us on our guard when we read predictions of an almost immediate boom in general business, but we can accept more readily an assurance that the electrical industry is actually already leading the advance. Increased electrical sales and bigger gross and net earnings are stated to have brought the industry to the verge of prosperity "equal to that of the past." Manufacturers report good earnings and good credit, and electric service and electric products are in demand; indeed, the New York correspondent of

The Times stated on August 18th: "Electrical production has now outstripped the peak attained at the time of the industrial boom in 1929." During the year ended May 31st 457,000 new domestic consumers of electricity were added, making the total 20,653,652; and the rate is accelerating, for May alone brought on 66,368 new users. If the output of electricity continues its present rate of increase the next winter peak, according to the *Electrical World*, will exceed the 1929 figure by 100,000,000 kWh. To our contemporary we also credit the statement that the returns of six months' operations by manufacturers are encouraging, "sales and billings" being up 15 to 50 per cent. over the corresponding period of last year.

Preparing for Bigger Business

THE prospect of further advance has given American electrical writers an opportunity of pointing to some special considerations that arise with bigger loads after a period of slackness. Accidents, to take one of the points mentioned, may be due to lack of care and training in operation owing to the "let-down" during the depression; or to the use of inadequate or obsolete equipment. Inadequate reserves and other causes must be remedied, and to that end every property and industrial plant should devote its attention to safety. So far as plant is concerned we read that observers who ask how long business will continue to increase answer their own question by expressing the view that it is good for at least nine months at an accelerated rate and that it is safe to measure generating capacity needs on this basis. It is a significant commentary on the American situation that however popular electrical sevice and products may be *they must be sold* and the setting up of joint bureaux and committees for sales promotion is advocated.

G.E.C. Shares Come Home

OUR readers will remember that about seven years ago there was a good deal of discussion on the fear that the control of the General Electric Co., Ltd., would pass into American hands owing to the acquisition by United States interests of a large number of the company's ordinary shares. In September, 1928, the company's articles of association were altered to deprive foreign holders of voting rights and to provide that the majority of the directors should be British subjects. Later it was proposed to issue 1,600,000 British ordinary shares which could be held only by British subjects, but the project was not proceeded with after the representatives of the American shareholders had assured Sir Hugo Hirst (as Lord Hirst then was) that they had no desire to secure control of the company. It was announced last week that a London group had arranged for the "repatriation" of a large block of G.E.C. ordinary shares which have been in American hands for some years, thus removing any likelihood of the control of this important concern passing into foreign hands.

Complete Cabling

IN the early days of electricity supply the laying of mains was a speculation and undertakings were justified in demanding substantial guarantees before proceeding with the work. Nowadays, although the element of risk is not entirely absent, it is one which enterprising authorities can afford to ignore. The latest town to pursue such a policy is Gainsborough. Mr. H. Breckell, the engineer and manager, has secured his Council's approval to the laying of mains in all roads and streets of the town. Intensive canvassing will be embarked upon, and the results should encourage other undertakings to follow suit.

Electrical Interference With Radio

THE prevalence of the sensitive superhet. type of radio receiver, and the increase in the use of domestic electrical appliances, neon signs, and other potential sources of radiated and conducted electrical interference are two factors which are resulting in increasing complaints by radio listeners that their reception is being spoilt. That the authorities and radio manufacturers recognise this is evidenced by the publicity which is being given to apparatus and methods for alleviating the trouble. At the Radio Exhibition, as mentioned in an article in this issue, the General Post Office, the British Broadcasting Corporation, the Electrical Research Association, and the Radio Manufacturers' Association have collaborated in the arrangement of a Radio Interference Bureau, where information and advice on the causes and cure of electrical interference may be obtained free of charge. In the absence of legislation on the subject the widest possible education is desirable.

The Ten-Thousandth

THE Hull Electricity Department is most progressive, both industrially and domestically. A measure of the advance in the latter direction is provided by the announcement that the department has just installed its ten-thousandth cooker. According to the latest report of Mr. J. N. Waite, the general manager and engineer, there were 75,000 consumers at March 31st last, so that although Hull's achievement is a remarkable one there still remains ample scope for still further efforts. The number of cookers connected during 1934-35 was 55 per cent. more than in the preceding year—a very substantial increase. The hire scheme in force is financed entirely from surplus revenue. The rentals are sufficient to cover maintenance charges and interest on the expenditure; the balance which remains is transferred to a depreciation account.

A Good Beginning

REFERENCE was made in our issue of May 3rd (p. 640) to the conjoint action taken by a number of British electrical manufacturers in preparation for railway electrification work. Important traction enterprises have since been entered upon for both London and Tyneside. The first-fruits of the closer working arrangement have taken the form of a contract for the complete electrical equipment of the rolling stock with the Associated Manufacturers of Electric Traction Equipment, Ltd., of which some particulars appear in our "Business and Industrial Notes" to-day.

Trailing Cables in Mines

WHILE it is pleasing to note from the report of Mr. J. A. B. Horsley, Electrical Inspector of Mines, that a more intensive electrification of collieries is not accompanied by any increase in the number of accidents attributable to electricity, it is not so satisfactory to find that trailing cables and plugs contributed a greater proportion to the total in 1934 than for many years previously. A greater use of electrically interlocked plugs and screened or pliable armoured cable (*i.e.*, with earthed metallic sheathing or stranded wire armouring protected by tough rubber) in conjunction with leakage trips would no doubt effect considerable improvement. The same degree of flexibility is not required for connections to loaders, conveyors, small haulages and pumps as for coal cutters, and a more robust form of cable could generally be employed in such cases.

Out of Evil

THE undue prominence given in the daily papers to electrical accidents —rarity being a recognised factor in news value—may be turned to good account if attention is at the same time drawn to methods of preventing them. Thus, at an inquest held at Leeds this week on the victim of shock from a portable electric drill, the jury added a rider to the verdict of "Accidental Death" to the effect that the drill casing should have been earthed. This appears to be a correct inference from the evidence and it is to be hoped that the publicity obtained in such ways for the proper use of electrical apparatus will do something towards reducing still further the small number of electrical accidents in industry.

Reconditioning Electric Cookers. By P. W. Bignell

How Eastbourne makes them "as good as new"

THE problem of renovating electric cookers is one which demands the very serious thought of all supply authorities hiring domestic equipment under simple hire agreements. With the improvement of design and the increase in the number of cookers hired the problem becomes more and more acute; in every change of tenancy, every disconnection, visions of another addition to the reconditioning shop immediately arise.

The morning mail may also be safely relied upon to bring in numerous instances informing the authority concerned that "My present cooker is now unsuited to my needs" or giving other reasons why a "new cooker *must* replace the present model in order to obviate the necessity for reverting to gas." There are, of course, numerous other excuses or reasons put forward by consumers when asking for an exchange, but those stated form the greater proportion and explain the reason why cookers which have been used find their way back to stores or the reconditioning shops.

The amount of work involved in the renovation of a cooker is dependent upon the age of the model, not so much from the point of view of use and care or otherwise given by the user, but from the original finish. Prior to about 1931 most undertakings hiring cookers used the then standard stoved black enamel finish, and it was not until that year that it became possible to obtain at a reasonable figure a cooker in the now popular and practically standardised grey mottled vitreous enamel.

Cookers purchased prior to 1931 are now the main cause of reconditioning worries because, apart from the black finish, rust holes in the back and sides and hotcupboard floors are often revealed, and if the design is too different from to-day's trend very often the expense involved is so great that scrapping is preferable, although in a good many cases the appliance has been in service for only four years and still has years of useful life before it.

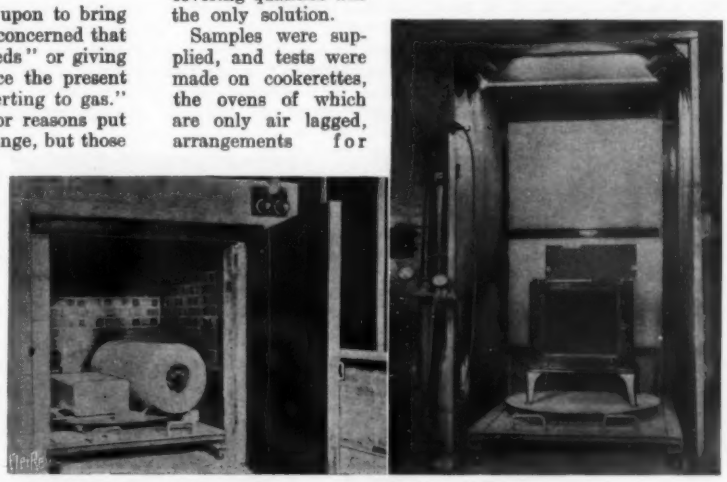
Vitreous enamel has done much to eliminate the rust bogy, although it cannot be claimed that it completely overcomes the trouble. Nowadays, the grey vitreous finished cooker is the only one which appeals to the potential user in the south of England, at least, and therefore the undertaking with both stoved black and grey finished cookers is faced with the problem of bringing those black cookers which are returned to stores into line as much as possible with the vitreous enamelled models. How is it to be done?

Early Experiments

In Eastbourne this particular query arose in 1932 and perhaps a description of the methods adopted, together with experience gained, will be of interest.

after a time "browning" under heat, especially round the oven door and the dull appearance of the cellulose paint as compared with the glossy finish of vitreous enamel necessitated improvements in these directions, and further experiments with other enamels were commenced. After considerable investigation it was decided that a heat resisting stoving enamel (600 deg. F. was specified) with glossy finish and good covering qualities was the only solution.

Samples were supplied, and tests were made on cookerettes, the ovens of which are only air lagged, arrangements for stoving being made. Grey of varying shades was the only colour then available, and this material had a synthetic resinous base. Results showed a great improvement approaching vitreous enamel in appearance, and after two days' heat test (oven on at full heat) no "browning" was noted.

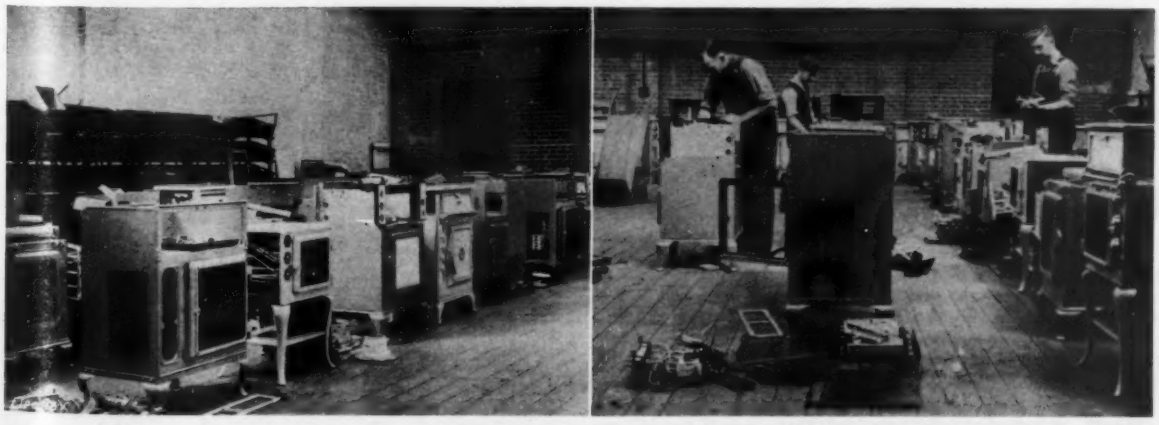


Left: Water heaters in the stoving oven which is also used for cookers. Right: The spraying cabinet with a prepared cooker on the turntable

The Spraying and Stoving Paint

By this time a spraying equipment comprising an electrically driven air compressor had been procured together with air reservoirs suitable for the supply of air at 80 lb. per sq. in., thus leaving an ample margin over the 35 to 40 lb. per sq. in., at which the paint is sprayed on. A suitable pressure gauge is incorporated together with a valve which provides a means of reducing the pressure to 10 to 15 lb. for mottling purposes.

The spraying cabinet is 7 ft. high by 4 ft. wide by 4 ft. deep to the extractor baffles. The fan extracts into a 20-in. air duct. The apparatus to be sprayed is placed on a steel turntable (mounted on six revolving castings), which makes it possible to push the equipment, without handling it while it is wet, directly into the stoving oven for treatment. Surplus spray from the pan is exhausted by means of an 18-in. electrically-driven exhaust fan placed in the back of the cabinet, this fan removing any fumes that might be noticed, although, thanks to the use of synthetic resinous enamel, there would be no injurious or otherwise objectionable effects.



In the reconditioning shop. The cookers in the left-hand picture are ready for reassembly and the right-hand illustration shows them being put together

Experiments were made with a cellulose grey paint with white mottling, a small portable spraying outfit being brought into service. The cooker was first of all stripped down completely and thoroughly cleaned in a caustic solution, all old paint being removed. The new coating was then sprayed on whilst the cooker was in pieces. The process was fairly successful and enabled the cookers to be replaced on circuit, but

At the same time a brick stoving oven 4 ft. by 4 ft. by 4 ft. 6 in. was constructed, loaded at 8 kW, the elements used being obsolete pattern oven elements controlled by two three-heat switches. One large or two medium size cookers are accommodated on the steel platform. The latter is fitted with ball bearing castors which permit of easy movement to any position. The walls are air lagged, being built of 4½ in. brickwork with a 2-in. steel cavity. A stoving temperature of 200 deg. F. is obtained in 45 minutes, and this temperature can be maintained indefinitely with the control at medium-low. Oven temperatures are measured by a maximum reading thermometer placed in a 30-in. metal tube which is inserted through a hole in the lagged iron oven door, by which means the actual temperature of the air at the centre of the oven is obtained.

As the result of using stoving enamel, we have obtained a better finish and appearance; larger number of cookers sprayed per gallon, *i.e.*, fifteen as against seven with cellulose; elimination of amyl acetate fumes; speeding up of the spraying process by reason of the fact that only one coat and mottling coat is required; and a reduction of painting costs, both in time and material.

Before and after treatment

During the course of discussions with makers' representatives concerning heat-resisting enamels, it was learned that it is impossible to guarantee a white enamel to withstand heat owing to the basic materials used in the pigments being practically destroyed in the bleaching process involved in obtaining the white. This difficulty has been overcome by using grey of varying shades, a darker grey for the first or ground coat with a much lighter shade for mottling or splattering. Difficulty with white has so far prevented the paint manufacturers from attempting to copy the light shade of the vitreous enamel of our standard cookers, which they have been requested to do.

One difficulty experienced has been the running of the mottling into the grey ground patches, the patches for some reason being darker than the rest of the coat. The makers term this "bleeding through," and after some discussion suggested lowering the stoving temperature from 210 deg. for half an hour to 150 deg. F. commencing heat which is allowed to rise to 200 deg. F. in thirty minutes. This has successfully overcome the trouble.

An innovation suggested by the browning around the oven door caused by cooking fumes is the finishing of a cooker completely in ivory colour, the parts around the oven and grill where browning is likely to occur to be meerschaum, shading from dark brown to ivory, thereby anticipating the browning trouble and at the same time creating a new finish. A number of cookers were so treated but in general it was found that public preference was given to the grey mottled colour, so this finish has not been persevered with.

Vitreous Enamelling of Sub-standard Cookers

Before commencing the stove enamelling of reconditioned cookers, information was received that reconditioned gas cookers were being vitreously enamelled at a cost of approximately £3 each, and as it was not possible to obtain the actual name of the firm doing the work, eight inquiries were sent out to various firms in England specialising in this class of enamelling. The replies were rather unsatisfactory, all but three firms asking to be excused from quoting.

The results were as follows: Two "Creda" cookers were returned after four months, finished and re-assembled and were indistinguishable from new. Another cooker was returned at the same time unassembled and parts were missing and castings had warped.

One vitreous enamelling firm, referring to a model sent to it as a sample for treatment, stated that some steel and cast iron is not suitable for undergoing the vitreous enamelling process, special steel and a mix of cast iron being necessary. This is the first information received that this special requirement is necessary, although we have dealt with two other firms specialising in this process.

The warping of the casting and box oven interiors of one of the cookers may have been caused by the fact that the iron was not suitable, but one firm stated that whilst every precaution was taken against this happening it could give no guarantee that warping would not occur; it did not suggest that a special mix of cast iron or a special steel should be used where vitreous enamelling is to be done. It has since been ascertained that the warping of sheet metal parts such as box oven interiors and enamelled shelves is partly due to the sand blast process used for the removal of old enamel. One firm has overcome this trouble and can re-enamel sheet metal parts without warping occurring. This has been accomplished, it is understood, by reducing the pressure used in the sand blasting process and taking a little longer time in removing the old enamel.

The Cost of Treatment

We have found that a small type cooker can be vitreously enamelled at a cost of £3 5s. 9d., plus 1s. 8d. for testing. A medium type cooker costs £5 2s., plus 1s. 8d., while a large one cost £5 6s. 6d. (re-assembly not complete).

The average costs of cleaning, stove enamelling, fitting necessary new parts, re-assembling, overhauling and testing, are given in the schedule printed below.

The lower cost of the stove enamel is due to improved spraying equipment, resulting in less waste. The enamel has a greater covering power than the cellulose, and only two coats of enamel are necessary instead of three coats of cellulose. This latter item, together with the improved equipment, also reduces the time required for painting a cooker.

The cost of materials, besides paint and cleaning gear, only includes such items of equipment as have invariably to be replaced. The re-enamelling of hobs and fitting of new enamelled crown plates would increase the cost from 4s. 6d. for the "baby" size to approximately 10s. for the other sizes. The fitting of new hotplates, switches, &c., is not included in the cost of materials.

After comparing these costs it is suggested that it is not worth while to send cookers complete for vitreous enamelling as those models which require such treatment are of obsolete construction, and the stoving process which we have now more or less perfected is such that the average user cannot distinguish between the two finishes, and therefore, although it may be said that the vitreous enamelling will prolong the life of the cooker by the prevention of rust, the extra cost is not warranted owing to the obsolescence of the models in question, and to the fact that all new cookers purchased are already vitreously enamelled.

Average Costs of Cooker Reconditioning and Finishing in Grey Mottle.

	CELLULOSE.				STOVE ENAMEL.			
Size of cooker ...	Baby.	Small.	Medium.	Large.	Baby.	Small.	Medium.	Large.
Cleaning and dismantling ...	10/6	12/6	15/–	17/6	10/6	12/6	15/–	17/6
Painting	5/9	7/6	8/6	10/–	2/2	3/3	3/7	4/6
Assembling ...	5/6	8/–	10/6	13/–	5/6	8/–	10/6	13/–
Overhaul and testing ...	1/6	2/–	2/4	2/4	1/6	2/–	2/4	2/4
Materials used ...	10/–	12/–	14/3	14/6	7/–	8/–	9/9	10/–
Total cost ...	33/3	42/2	50/7	57/4	26/8	33/9	41/2	47/4
	Cellulosing of cookers commenced 6.6.1932. Av. price per cooker £2 5s. 10d. No. of cookers done, 60. Total cost, £137 10s. 0d. Average cost of cellulose per cooker (medium size), 7/–.				Stoving of cookers commenced 6.3.1933. Av. price per cooker £1 17s. 3d. No. of cookers done, 70. Total cost, £130 7s. 6d. Average cost for stove enamel similar size cooker, 2/6.			

In reconditioning cookers which already have enamelled hobs, crown plates, etc., it is in some instances necessary for these parts to be renovated in order that the cooker may go out again on circuit as new, and during the past year such parts have been re-enamelled at the average cost of 6s. for hobs and 10s. 6d. for box oven interiors by a London firm. The question of re-enamelling crown plates has been carefully gone into and although this work is undertaken it has been found much cheaper to purchase new plates made to pattern

in London. The average cost of re-enamelling a crown plate amounts to 3s. 6d., whereas the firm mentioned will supply a new article for an average price of 2s. 6d. or thereabouts.

During the year April 1st, 1933, to March 31st, 1934, a total of 229 cookers were reconditioned and hired out at similar rates to the new all-enamelled models. Seven different makes, comprising twenty-eight types and sizes of cookers made up this number, and the total cost of £453 17s. 8d. gave an average of £1 19s. 8d. per cooker. This price covered all time and materials used in the reconditioning and can be considered extremely satisfactory, by far the greater proportion of cookers renovated being of the medium size, hired at a rental of 7s. 6d. per quarter.

In August, 1934, the two large tanks holding the caustic solution into which the cooker parts were dipped for cleaning, were replaced by a hot tank. It was found by experiment that whereas grease and paint took 24 hours or more to remove by the old method, when dipped into a tank of boiling solution the desired result was obtained after only two hours' immersion. The same bath was mixed and, after boiling, paint and grease left the surface of the metal completely, the cooker parts going forward for painting in a perfectly clean and new state.

During the past year 275 cookers were renovated at a total cost of £624 10s. 4d., an average cost of £2 5s. 5d. per cooker. The cookers were fitted with re-tinned oven and grilling equipment, newly enamelled crown and drip plates, and, in practically every instance, re-enamelled hobs. They comprised seven different makes and twenty-nine types and sizes. It was found worth while to re-tin pans and grid shelves, etc., the average cost working out at about 9d. per article.

The costs for 1934-35 show a slight upward trend, due, no doubt, to the longer time taken and additional materials used to practically reconstruct large models that had been brought in rusted through. It has now been decided that it is not profitable to recondition in cases where considerable rusting has taken place. To judge from experience, scrapping is then far more economical.

The costs given could probably be lowered by organising re-assembly work along mass production lines, the work being done at present largely by men in the late shift, who work until 11.0 p.m., their other duties consisting of attention to consumers' complaints received by telephone after office hours.

Finally, three years' experience of reconditioning as it is carried out at Eastbourne has demonstrated that a minimum added life of two years can be expected by the expenditure of £2 5s. per cooker. Thus two years' rent compensates for the expense incurred in renovation; meanwhile, the apparatus is also serving to keep down the quantity of new cookers that have to be purchased, effecting a direct saving in capital expenditure.

A New Orient Liner

THE latest addition to the fleet of the Orient Steam Navigation Co., Ltd., is the R.M.S. *Orion*, which was launched last December at Barrow-in-Furness with the aid of wireless by the Duke of Gloucester while he was in Australia. The vessel will enter the regular England-Australia service next month.

Built by Vickers-Armstrong Ltd., the *Orion* is 665 ft. long and 84 ft. broad, of a tonnage of 23,371 and 24,000 h.p. The twin propellor shafts are driven by two sets of Parsons-type steam turbines, each with three cylinders working in series through gearing. The six Babcock & Wilcox boilers operate at a pressure of 450 lb. per sq. in. at a temperature of 725 deg. F. in conjunction with superheaters, tubular air heaters, and closed hot feed system. They burn oil fuel under forced draught on the closed air duct system with open stokeholds, served by five double-inlet electrically driven Howden fans.

The principal engine room auxiliaries are steam driven, all the remainder being motor driven with electrical equipment supplied by W. H. Allen, Sons & Co., Ltd., Laurence, Scott & Electromotors, Ltd., Metropolitan-Vickers Electrical Co., Ltd., and Crompton-Parkinson, Ltd. The deck machinery is motor driven, mostly under the Austin system of control, the capstans, windlasses and winches being by Napier Bros., Ltd., and the Metropolitan-Vickers Electrical Co., Ltd. The steering gear is of Brown Bros.' electro-hydraulic type. The hoists and lifts are by H. Morris, Ltd., McTaggart, Scott & Co., Ltd., and the Express Lift Co., Ltd.

The electricity generating plant consists of three 500-kW, 220-V d.c. turbine-driven dynamo sets, and one 90-kW, 220-V Diesel-driven set on an upper deck level for emergency use, all by W. H. Allen, Sons & Co. The main switchboards are by Whipp & Bourne, Ltd.

The insulated cargo space (also the ship's stores and part of the ventilation system) is refrigerated on the CO_2 system with air circulation. The plant is by J. & E. Hall, Ltd., driven by a 125-h.p. motor with starters, both by the British Thomson-Houston Co., Ltd. Small refrigerators installed are of the Hall, "Frigidaire," and "Asco" types. The fire fighting installation is extensive and varied. The alarm equipment is of G.E.C. make, with a detecting system by W. Kidde & Co.

Ventilation throughout is on the punkah louvre system whereby fresh air is blown in through ducts by motor-driven fans (Thermotank, Ltd.). The first-class dining saloon has its own carrier air-conditioning plant, regulating both the temperature and humidity of the ventilating air. Electric radiators built into the cabins and some of the public rooms are of the "sausage" lamp type without exposed elements.

Two views of the accommodation aboard the "Orion"

Telephones were installed by the Telephone Manufacturing Co., Ltd., and electrical fittings by the General Electric Co., Ltd., and the Engineering & Lighting Equipment Co., Ltd., Crabtree, Igranic and G.E.C. switches being used. The equipment in the galleys, some of which is electric, was supplied by Henry Wilson & Co., Ltd. Lighting fittings were provided by the G.E.C., Harvey & Co., Wm. McGeoch & Co.; the berth lighting fittings by Harcourts, Ltd., and the lamps by the Metro-Vick Co. The cables installed were made by W. T. Glover & Co., Ltd., batteries by the Chloride Co., and bell indicators by Gent & Co.

In the hairdresser's shop there are numerous electrical devices, while the wireless equipment is very complete.

"Cuprox" Discs as Heat Relays.

Their operation and field of application

THERMAL relays and regulators have a large application in various branches of engineering, the usual type being one employing bimetallic strips, which, when subjected to heating, bend, thus closing the contacts of a relay. But such relays are somewhat complex and insufficiently sensitive owing to the effects of ambient temperature, rendering accurate calibration difficult.

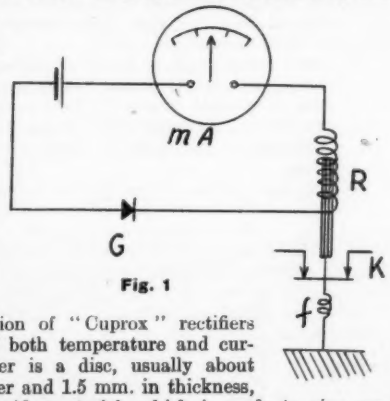


Fig. 1

A new principle evolved by Prof. Siroksky and N. Teibel (U.S.S.R.), described in *Electrichestvo* January, 1935, deals with the application of "Cuprox" rectifiers for the control of both temperature and current. The rectifier is a disc, usually about 30 mm. in diameter and 1.5 mm. in thickness, of special copper-oxide material, which is made to give contact with a metallic rod. The ratio of resistance to the flow of current in the two directions can be of the order of several thousands of discs of American manufacture.

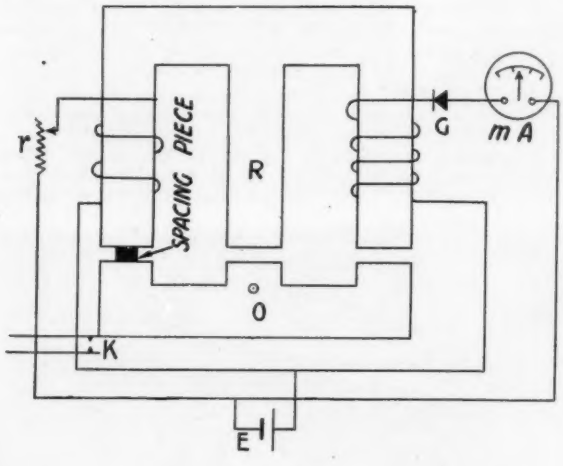


Fig. 2

However, with the heating of the rectifier this ratio diminishes rapidly according to the law $R_t = R_o\, a^{-t}$, which applies to all unilateral conductors. Use is made of this property of "Cuprox" discs for the construction of thermal relays. The rectifier must in the first place be connected in a d.c. circuit so that it opposes the current flow. Whilst the temperature of the "Cuprox" disc remains low, the current flowing will be of very low value; but if the disc is heated, the current will increase several-fold.

Fig. 1 is a schematic diagram in which G is the rectifier, R the relay and *f* the adjustable spring controlling the magnitude of the current and hence the operating temperature of the relay. For accurate working the supply voltage must be steady, but this condition is not usually obtainable in practice.

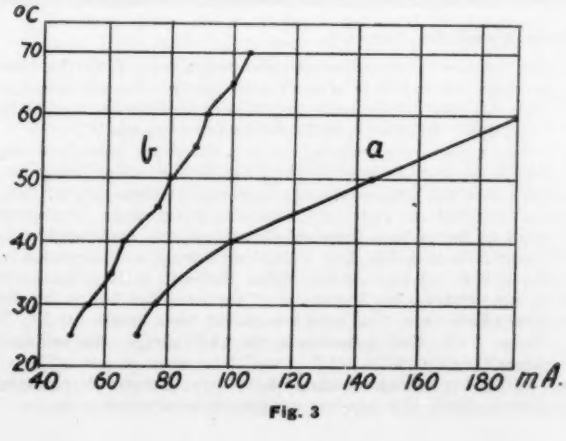


Fig. 3

A Magnetic System

To obviate this difficulty the arrangement shown in fig. 2 can be employed. This consists of a magnetic system, the two windings of which are fed from the same source. At low temperature the current flowing through the rectifier circuit will be very small, and consequently the anchor, which swivels about the pivot O, will be attracted by the left-hand winding, thus keeping the contacts of the relay K open. Upon the heating up of the rectifier the current in its circuit will rise and at a pre-set value close the contacts. The milliammeter shown is for experimental purposes only.

The first experiments were carried out with discs having a conductivity ratio of 2 : 1. Besides the small ratio these discs possessed a very thick oxidised layer and were rough in construction. In regulating the temperature of functioning of the relay, the results obtained were consistent within 1.5 deg. to 2 deg. The relationship between *t* and I is shown by the curve "a" in fig. 3. Curve "b" is derived from curve "a" for the condition when the rectifier is introduced into the circuit, in which case $E = I(R+r)$.

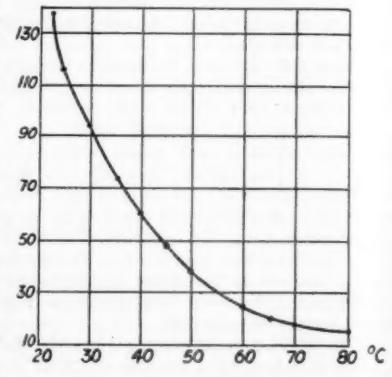


Fig. 4

$$\text{So that } R = \frac{E - Ir}{I} \text{ and } I' = E \div \frac{E - Ir}{I}$$

Fig. 4 shows the variation of opposing resistance with the temperature, for discs having a conductivity ratio of 10 : 1. The test was carried out with the discs immersed in oil in order to maintain constant temperature. The results obtained illustrated absolute consistency.

The rectifiers described offer a cheap method of introducing thermal protection by the simple expedient of incorporating the discs in the cores of transformers and generators. A milliammeter can also be used to indicate the temperature at any time. By means of a remote system the temperatures of various plant can be observed from one point as shown in fig. 5.

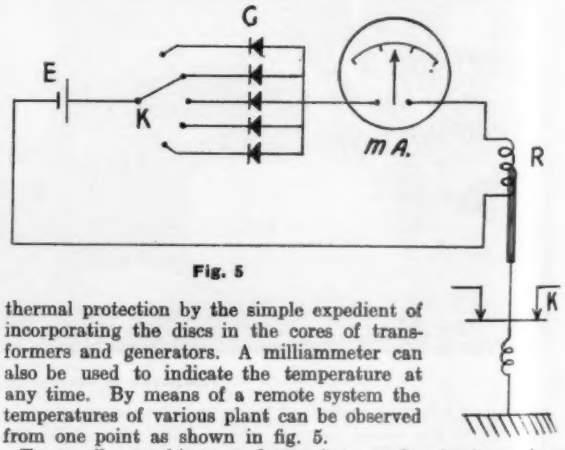


Fig. 5

For smaller machinery and transformers the simpler spring controlled relay can be used as shown in fig. 1, and the latter can be made to operate a warning lamp or an audible signal. The location of any machine is rendered quite easy.

It is also possible in the case where the number of machines is large to introduce a motor as well as hand-operated contact arm (fig. 5). In the event of an overload, the motor can be switched off and the machine located by manual operation of the contact arm. A thyratron can also be used instead of a relay for operation of signals.

Besides the applications mentioned a number of others present themselves, such as the protection of bearings, fire signals and measurements and regulation of temperature up to 100 deg. C. for medical uses.

There is a tendency at present to use various metallic

materials by making use of their property of variation of resistance with temperature. The change in resistance in these, however, is approximately 0.3 per cent. to 0.6 per cent. for 1 deg. C., whereas in the case of "Cuprox" discs it is of the order of 15 per cent. to 20 per cent.

The characteristic steepness of the cure t/I helps considerably to simplify construction and dispenses, in many instances, with the use of amplifiers.

The relays described here are designed to work at temperatures up to 100 deg. C. The problem of reaching higher temperatures is at present being investigated with materials, such as oxides of calcium, boron, &c., all of which follow the same law and indicate similar consistency. The slope coefficient for these materials at certain temperatures is found to be several hundred times greater than the thermal coefficients of iron and tungsten.

A Swedish Testing Laboratory

NEW testing equipment has recently been completed by the Swedish Asea company at its Ludvika works. The laboratory is in a building with an arched roof, and a small room along one side is used for tests at normal frequencies and up to 300 kV. On the other side of the building are a large short-circuit testing bed and a small building for tests with heavy currents at low voltages, while in front is a concrete hut from which the tests can be watched.

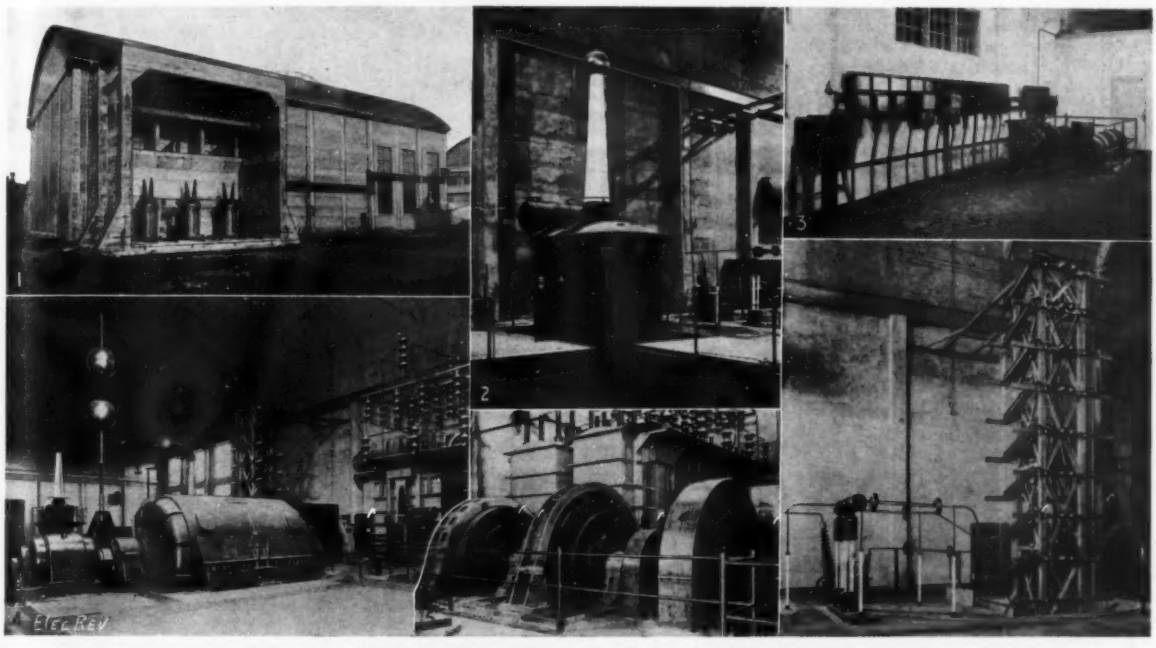
In the main testing laboratory near the incoming railway track is a large pit for the assembly of transformers which are too large to be handled by the workshop cranes. The 100-ton laboratory crane can handle these after assembly and load them on to railway cars. With the 80,000-kVA generator for short-circuit tests a rupturing capacity of over one million kVA can be obtained. The generator windings are divided into two groups per phase, with 3.75 kV per group, so that voltages of 13, 7.5, 6.5, or 3.75 kV are obtainable. The speed rotor runs at 1,500 r.p.m., being air-cooled, while the stator weighs 102 tons and is carried on springs so that during a short-circuit it can rotate about one inch concentrically with the rotor. Protection is by a partially automatic carbon dioxide fire extinguisher.

For voltages higher than that of the generator, two banks of three single-phase transformers have been provided. On the h.t. side of each transformer are double concentric windings on each leg. These are designed so that the reactance of the outer and inner windings is the same, and they can thus be connected in parallel. In this way one bank of transformers with star connections on the h.v. side can give 33, 66, and 132 kV, while the other bank gives 22, 44 and 88 kV. Connected in series, the two banks give 55, 77, 88, 110, 121, 154, 176, and 220 kV. For each of the thirty transformer connections the generator can be connected in four different ways. Each transformer bank is rated 100,000 kVA. Armoured cables are used as the conductors leading to the testing beds. One million volts is obtained directly by transforming in a single step. The capacity of the transformer is 10,000 kVA, or 10 A at 1 million V, and it weighs 80 tons, including the oil. It is 34 ft. high and is supplied at 7 kV from an 1,850-kVA generator driven at 750 r.p.m. by a d.c. motor.

Sixteen large testing condensers are arranged in eight pairs. When connected in series to obtain maximum voltage the capacity is about 0.0023 μF, or 2,000 cm., while at the lowest voltage the capacity becomes 0.15 μF or 130,000 cm. The condensers are fed from a 125-kV single-phase transformer, the current being rectified by two hot cathode tubes over water resistances.

In this way each of the eight pairs of condensers can be charged to 300 kV. When every pair is fully charged the theoretical voltage should reach 2,400,000 V, but in practice only about 2,000,000 V, depending on the shape of the wave, is obtained. By replacing some of the water resistances by metal tubes theoretical voltages of 1,200,000, 600,000, or 300,000 can be obtained. Other arbitrary values can be obtained by reducing the distance between the intermediary ignition spheres.

For tests under oil a tank 10 ft. in diameter and 16 ft. deep is provided. Two cathode ray oscillographs are used for checking the tests. They are mounted in a closed steel-plate case as a means of protection against the effects of stray high frequency fields.



The Asea testing laboratory at Ludvika

1. A 132-kV circuit-breaker on the testing bed. 2. 1,000,000-V transformer. 3. Laboratory office and generators. 4. Short-circuit generators and driving motors, with high-voltage equipment in the background. 5. Exciter set for the short-circuit generator. 6. Impulse generator and charging equipment

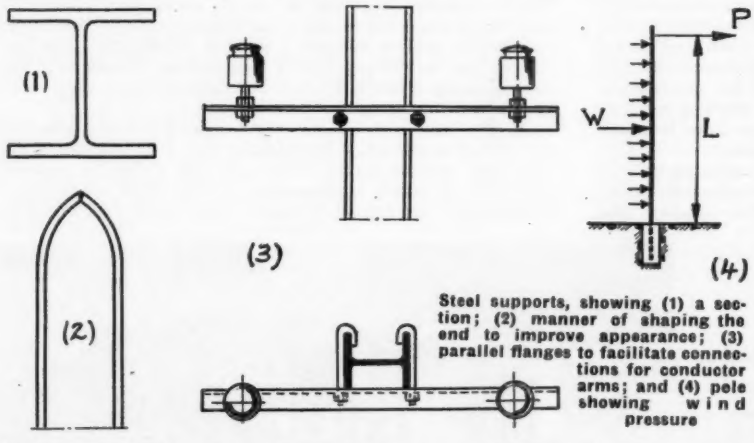
E.I.B.A. Moving

THROUGH the generosity of the B.E.A.M.A. the headquarters of the Electrical Industries Benevolent Association are being removed to 36, Kingsway (fifth floor), London, W.C.2. This is a change which everybody should take a note of, because it is really everybody's organisation—or it ought to be. The removal from Southampton Street will date from September 7th, and the telephone number will be altered to "Holborn 1437." The accommodation will be greatly improved. Among recent donations to the funds there is one of £25 from the Primary Cell Manufacturers' Conference. In connection with the annual festival ball which, as already announced, will be held on November 26th at Grosvenor House, two supporters of the Association have promised to bear the cost of the band and cabaret, thus setting an excellent example to others who may be willing to bear the cost of something else. It is the policy of the E.I.B.A., and long has been so, to find work for men out of a job, whenever possible, and it is satisfactory to learn that several men have been found light sub-station work by the Central Electricity Board.

Pole Supports for Overhead Lines. By L. F. Villiers

Why steel is to be preferred

TIMBER is commonly used for overhead line pole supports having light loads, Norwegian red fir being largely used in this country. The chief disadvantage is the susceptibility of timber to decay, due to dry or wet rot. White ants also cause considerable deterioration. The most effective means of preserving timber is to fill the pores, so as to prevent moisture penetrating. To this end creosote is usually applied under pressure; the Reuping process consists of placing the timber in a cylinder and creosoting under a pressure of 150 lb. per sq. inch.



Steel supports, showing (1) a section; (2) manner of shaping the end to improve appearance; (3) parallel flanges to facilitate connections for conductor arms; and (4) pole showing wind pressure

To prevent dry rot Boucherie's process is sometimes used. This consists of forcing copper sulphate along the fibres. The factor of safety permitted by the Electricity Commissioners' Overhead Line Regulations is 3½ on the elastic limit of tension members and the crippling load for struts.

Generally concrete is not an economical material for line supports. Poles made of reinforced concrete are considerably heavier than those of equivalent strength in wood or steel. Great care has also to be taken to prevent damage during transit. The factor of safety permitted by the Electricity Commissioners is the same as for timber poles.

In my opinion steel is the most suitable material for all classes of supports. Broad flange beams have been very successfully used for telegraph and transmission poles, and also the portal and cantilever types for railway electrification and tramway systems. These sections are square in shape up to 12 in. by 12 in. (fig. 1), and have a range of several weights for each size. They can be rolled at the rate of 500 to 1,000 tons a day. They are cheaper than the tubular type of pole, and the whole surface is accessible for painting. For appearance the ends can be shaped in the manner shown in fig. 2. Connections for conductor arms are facilitated by the parallel flanges (fig. 3).

These sections are also preferable to lattice poles, which are always more susceptible to corrosion. It should be borne in mind that the failure of one tie or strut may eventually lead to the collapse of a pole. In design, therefore, small ties and struts should always be thicker than is theoretically necessary. The rising cost of fabricated work is also a factor to be reckoned with. For particularly heavy loading and heights above the average, however, a lattice member is indispensable.

The factor of safety permitted is 2½. This is an important consideration in design, and should not be overlooked when selecting a material for pole supports. Although this is a lower factor of safety than that allowed for concrete or timber the stress is still on the low side for good quality steel.

Let P=net safe load on the pole in lb.; f=safe stress in tons per sq. inch; L=effective length of pole in feet; w=wind pressure in lb. per sq. ft.; Mx=section modulus; and W=total wind pressure on pole in lb. (fig. 4). To agree with the Electricity Commissioners' requirements w=8 lb. per sq. ft.

The stress $f=\frac{\text{Elastic limit}}{2\frac{1}{2}}$. In the case of a 26-30 ton tensile steel this would equal $\frac{15.6 \text{ tons}}{2\frac{1}{2}}=6\frac{1}{4}$ tons per sq. in.

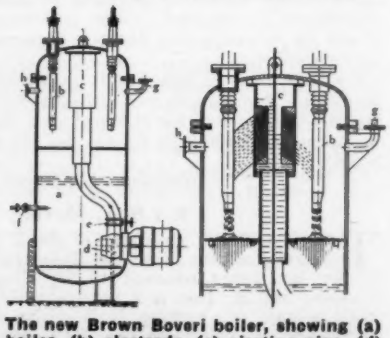
Then $P=2{,}240\ \frac{Mx\ 6\frac{1}{4}}{12L}-\frac{1}{4}\ W=\frac{1{,}167\ Mx}{L}-\frac{1}{4}\ W.$

A New Electrode Boiler

Over 10,000 kW capacity

A TYPE of high-voltage electrode water boiler, which differs completely from all previous designs in principle and construction, is announced by Brown, Boveri and Co., Ltd., of Baden, Switzerland. The main feature is that current does not flow from immersed electrodes through stationary water, but is conducted through water jets which radiate continuously from nozzles to the electrodes.

The three built-in electrodes are arranged concentrically about a vertical ejection pipe, which is provided with three vertical double rows of nozzles. A motor-driven circulating pump forces water from the lower portion of the boiler up the central pipe from which it flows in jets against electrodes. They are constructed so that the water impinges on their inner surface tangentially, spreads over the inner surface and is deflected in such a manner that it acquires a circulative and downward motion. In this way dispersion of the water, which would interfere with the electrical conductivity, is prevented. At the same time the centrifugal effect assists in the separation of the steam produced from the water. At their lower ends the spiral shape of the electrodes changes to a circular one, so that a tubular extension is formed which collects the water caught in the spirals and concentrates it into a jet.



The new Brown Boveri boiler, showing (a) boiler, (b) electrode, (c) ejection pipe, (d) circulating pump, (e) regulating throttle valve, (f) feed valve, (g) safety valve, and (h) steam outlet

A sheet-metal cross is built into this tubular extension to stop the circulative motion, and thus the water leaves the electrode at the bottom in a compact downward jet. The water then impinges on a perforated plate, which is electrically connected with the side of the boiler, and flows through it into the collecting chamber.

In this manner two current paths of constant length are formed per phase between the neutral point of the electrical system, to which the boiler shell and the injection tube are connected, and the electrodes, one of the paths being between the ejection tube and the electrodes, the other between the electrodes and the perforated plate. Along both these paths the water is heated and evaporated due to its own resistance. Under normal operating conditions the jet water is practically at evaporation temperature, as it flows continually in a closed circuit, so that a very small portion of the electrical energy supplied is used for heating the water, the major part being used for evaporating it.

Apart from the bushing insulators this type of boiler has no ceramic parts inside it. Furthermore, the insulators are not immersed in the water. This preserves them from attack and so reduces the need for periodic renewal.

The output of the boiler is regulated exclusively by adjustment of the pump throttle valve, which varies the quantity of water circulated so that a greater or smaller number of nozzles is brought into service. Thus at partial loads water is not sprayed over the whole length of the surface of the electrodes.

These new electrode boilers are built for three-phase operation at 2,000 V and upwards, and for from 300 to 10,000 kW and over. They can also be made for single- and two-phase circuits, and for all steam conditions, with or without automatic control.

The Radio Exhibition—II. By W. E. Miller, B.A.(Cantab.), M.I.W.T.

Valves, batteries and other equipment

BEFORE describing the radio accessories at the Exhibition, mention should first be made of an interesting receiver which, owing to its late arrival, could not be included in last week's article. This is the "Aeromagic" receiver, by Aerodyne Radio, Ltd., and its features include automatic tuning and remote control. A flexible 10-way cable couples the remote control unit to the receiver proper, and by means of a press button, a switch and a volume control on the unit, it is possible to operate the receiver automatically. The action of pressing the button merely starts the series of operations. After this, tuning to a station is entirely automatic, being performed by the carrier wave of the station itself, which, through a relay system, stops the motor driving the tuning condensers at the correct point for the station.

Rear view of the "Stentorian Duplex" speaker by Whiteley Electrical. This is a twin unit, with a large diaphragm and a central small horn for the upper register. Separate volume controls are fitted to vary the balance

Last year saw the introduction of many multi-purpose valves, such as heptode, octode and triode-pentode frequency changers, double diodes for detection and a.v.c., double diode-triodes for the same purpose and l.f. amplification in addition, double diode-pentodes and others. This year, these valves are generally continued, with improvements in many cases, but there are a few newcomers. One of these is the "Osram" triode-hexode, a new type of electron-coupled frequency changer, claimed to be very effective on the ultra-short wave-bands, and free from "pulling" between the oscillator and signal frequency sections. The G.E.C. also shows a neat midget valve, the "A537," specially intended for microphone pre-amplifier work, and claimed to be very free from valve noise.

The High Vacuum Valve Co., Ltd., besides its ordinary "Hivac" types of valves, is also showing some "midget" models, which are already being used for small receivers, deaf aids, and similar apparatus. The full range comprises four types; the valves are only about 2¼ in. long and ¾ in. in diameter, and are fitted with special bases. On the Hivac stand examples of receivers built into cigarette cases, books and other small objects are to be seen. Two other interesting types are also to be seen here. One is a special valve for "volume expansion" circuits, comprising two triodes with variable-mu characteristics. The use of this valve in a special circuit gives an automatic increase in the ratio between the maximum and minimum volume levels, which, of course, is artificially curtailed by the control engineers in ordinary transmissions. The other special type is the Hivac-Harries output valve. This is a pentode which, by the use of critical anode spacing, is claimed to give a larger output than an ordinary pentode of similar type, with a smaller percentage of harmonic distortion.

A group of the Everett Edgcumbe "Radiolab" test instruments, constructed on the unit system

Mullard's have an interesting display on their stand, demonstrating very effectively by means of three cathode ray tubes, the manner in which their octode frequency changers operate.

Several firms are showing high efficiency output pentodes which can be fully loaded from the diode second detector of a superhet without the use of an intermediate l.f. stage. Many of this year's superhets use these valves, or the combined double diode and output pentode.

Cathode ray tubes and complete oscillographs are shown by Cossor and Ediswan. Both these firms now manufacture the "hard" type of tube designed for television work.

Loud-speaker Design

Very little in the way of development has occurred recently in loud-speaker construction. The moving-coil type is almost exclusively used, even in receivers of the portable type. Research in magnet alloys has resulted in the production of permanent magnets of remarkable field strength and, at the same time, relatively small bulk. Darwins, Ltd., and Swift Levick and Sons, Ltd., are exhibiting nickel-aluminium and nickel-aluminium-cobalt alloy magnets of high efficiency which are largely used in modern permanent-magnet moving-coil speakers.

There is increased interest in the use of two or more speakers together in order to obtain the widest possible frequency response. Generally, a normal type of speaker is used with one of the small "tweeter" type, the latter taking care of the upper register. The "tweeter" may have a small moving-coil unit, with a miniature diaphragm or horn (the latter being used by Celestion, Ltd.), or it may be of the type in which use is made of the piezo-electric effect of Rochelle salt crystals. This type of "tweeter" is fitted with a small diaphragm, and is shown by Sonochorde Reproducers, Ltd. This firm also shows piezo-electric pick-ups, as do Ediswan.

Certain manufacturers, by a special design of coil and diaphragm, or by a dual diaphragm, secure an excellent reproduction of the upper register without the necessity for a "tweeter." Among these may be mentioned Hartley Turner and Haynes Radio. The Primustatic electrostatic type of speaker is also of interest. The use of an exponential shaped diaphragm is also becoming popular, since this is said to result in more even distribution of the upper register, eliminating the usual "focusing" effect.

An Oldham accumulator with the "capacity clock" feature

Batteries and Battery Chargers

Most of the well-known battery firms are exhibiting, these including Britannia Batteries, Ltd., Chloride Electrical Storage Co., Ltd., Ediswan, Ever-Ready, Fuller, G.E.C., Hellesen, Oldham, Peto and Radford, Siemens, and C.A.V. As might be expected, detail improvements, rather than new principles, are the features of these exhibits.

The Chloride Co. now employs its "Ironclad" principle in the positive plates of certain radio l.t. cells. The visible charge indicating dial is also fitted in many types. Oldham's have a "capacity clock" feature for indicating the state of charge of their accumulators, while certain other makers, notably Peto and Radford, with their "tell-tale" device, have some form of indicator.

"Dry" h.t. and g.b. batteries are to be seen in profusion, a feature being the manufacture of special types and sizes to suit special receivers. Thus Chloride have no fewer than 140 types of their "Drydex" h.t. batteries available. An interesting h.t. accumulator is that of the Milnes Radio Co., Ltd. It is of the nickel-cadmium alkaline type, and is fitted with a special rotary switch which, in one position, connects groups of four cells in parallel for charging from

The new de-luxe "Avo-Oscillator" for service engineers

a 6 V supply, and in the other position, connects all groups in series for discharge as a h.t. accumulator.

Several exhibitors are showing battery charging equipment, mainly for dealers' use. These include the Crypto Equipment Co., Alfred Diggle and Co., Ediswan, Partridge, Wilson and Co., and Westinghouse.

Service Equipment

One of the features of the show is the number of firms exhibiting testing equipment, measuring instruments, and similar apparatus for service engineers and radio dealers. Two or three years ago there was very little of this, but recently the service engineer has begun to be recognised as

One of the many Belling-Lee interference suppressors

a most necessary member of the industry, with the result that many firms are now producing equipment for his special needs.

The Automatic Coil Winder and Electrical Equipment Co., Ltd., which some years ago introduced the "Avometer" combined instrument for voltage, current and resistance measurements, shows this in its latest form, together with smaller editions of it. Various modulated oscillators for receiver alignment and adaptors for valve measurements are to be seen here.

Everett Edgcumbe now have a redesigned and very complete range of "Radiolab" test gear. Some of this is built on the unit principle, and a complete outfit can thus be acquired by the service engineer in gradual stages. The Weston Electrical Instrument Co. is showing its set analyser, together with a new and improved modulated oscillator. Ferranti have a separate stand devoted entirely to instruments, while Wm. F. Brown and Wright and Weaire also show a profusion of testing and measuring instruments for gauging the performance of receivers.

Components, though by no means as prominent as they have been in the past, are still to be seen on many stands. The condenser manufacturers, such as Dubilier, Telegraph Condenser Co., Ltd., Telephone Manufacturing Co., Ltd., and the British N.S.F. Co., Ltd., are well represented, while a number of exhibitors, such as Bulgin, Stratton and Co., British Television Supplies, Colvern, Varley and others show ultra-short-wave components. Wires for radio and similar work are to be seen on several stands, one of those devoted entirely to wires being British Permel Enamelled Wire, Ltd., a subsidiary of Johnson and Phillips, Ltd. Here may be seen a pinhole testing machine, demonstrating the rarity of pinholes in Permel enamelled wire.

Interference Suppression

For the first time there has been a definite attempt at the radio exhibition to bring home to visitors the causes and cure of "man-made" interference with radio programmes. Previously it has been left to individual firms, notably Belling and Lee, Ltd., to do this on their own stands. This year, Belling and Lee are continuing their anti-interference campaign on a larger scale, while other firms such as Dubilier, T.C.C. and T.M.C. are also exhibiting representative types of interference suppressors.

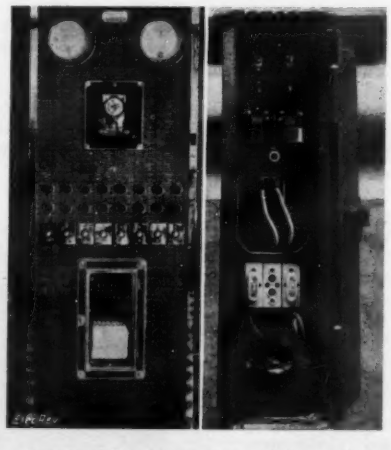
In addition to these displays a bureau on electrical interference has been established in the main hall, jointly by the General Post Office, the B.B.C., the Electrical Research Association and the Radio Manufacturers' Association. At this bureau, experts are available to advise, free of charge, on all interference problems, pamphlets on the subject are being distributed, and a suitable questionnaire form is available.

The exhibits include representative suppression devices, interfering and non-interfering apparatus, and also the special interference measurement equipment designed by the E.R.A. It is emphasised that wherever possible interference should be cured at the source, but disturbances may be minimised by the use of properly designed mains filters and aerial-earth systems. The G.P.O. exhibit also contains a large section devoted to interference problems.

In leaving the subject of this year's show, which closes tomorrow, August 24th, it should be pointed out that much of the apparatus described in these articles will be on view at the Scottish and Northern National Exhibitions which are to be held shortly.

A French Distant Control System

A SYSTEM of distant control and signalling without the use of a pilot wire or addition to the lines has been evolved by MM. Durepaire and Perlat and applied in France The method is based on the principle that even when the neutral is earthed the resistance of the earth connections is never zero; therefore, any current sent into the neutral will, in spite of the earth connections, run along the whole neutral network.



Transmitting apparatus giving eleven different combinations, and (right) a relay in the base of a lamp standard for switching the light on and off

The system comprises a transmitter at any given point on the neutral network, and a series of receiving relays at such points as may be desired. The sender has a source of d.c., which may be a generator, although for security it is better to use a set of storage batteries. The d.c. is fed into a pendulum similar to that of an electric clock; with a reverser this changes the d.c. to a.c. of an extremely low frequency of from 0.8 to 2 cycles per second. There may be any number of these pendulum and reverser combinations to give any desired number of operations on the system. One wire from the reverser goes to the neutral system and the other to an earth connection.

It is only necessary to press a button corresponding to the operation to be effected to set the pendulum of the proper frequency in motion, and by this means send out the signal current.

The control system is composed of three selective relays tuned to a definite frequency and a more or less complex switch. The selective relays are composed of a moveable frame mounted on a pivot. In order to obtain the least possible damping no closed moving conductor is provided, the moveable frame being placed in the field of a permanent magnet.

On this movable frame are arranged two arms bearing small masses, the distance from the centre of which can be regulated by screwing them back and forth. Two small spiral springs convey the current to the moving frame, and at the same time serve to damp out the movement of the frame when the current is cut off. The mechanical constants of the whole cause the frequency of oscillation of the frame to equal the frequency of the current which acts on it. The moving part of the relay is a small platinum arm which engages with a fixed contact and thus operates the switches it is desired to open or close.

The Brussels installation is intended to switch on and off two separate groups of lights. For this four different frequencies are used, relays of two frequencies being placed in the base of each lamp, together with the switches to turn the lamp on and off.

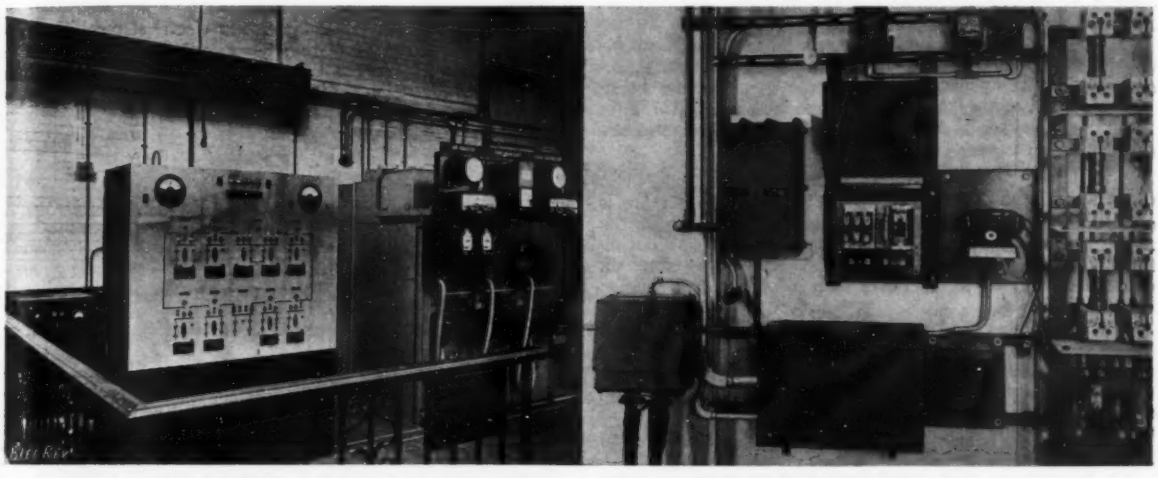
An installation of the same system in Paris is somewhat more complex, being intended to control electric meters arranged for different rates for day and night consumption, as well as for various signals between the station and points on the network. There are eight different frequencies, making possible eleven different operations.

Supply Network Control

An application of the remote supervisory system at Winchester

AN interesting example of remote supervisory control of a supply network is that recently completed for the main distribution system of the Winchester Corporation Electricity Department. Nine sub-stations are linked by an 11-kV ring main which may be fed and run in two halves or as a complete ring, and any "sub" may be disconnected without breaking the continuity of the main. A four-wire pilot cable provides for both the supervisory control and protection of the main cables and equipment.

Control is centralised at the power station and the supervisory equipment, which has been manufactured and supplied by the General Electric Co., Ltd., indicates oil circuit-breaker positions; operates transformer tap changing equipment, showing at the same time the reading of the l.p. bus-bar volts, and indicating the transformer tapping; indicates, on demand, the l.p. bus-bar voltage and transformer load; and gives telephone facilities between all stations on the ring main. The indication is given at the control point in respect of each sub-station, and tap changing of any transformer may be effected by the control officer.



Power station cubicle and sub-station cabinet of the Winchester supervisory control system

The equipment at each sub-station consists of a uniselector and associated relays, fitted in a wooden cabinet. A similar cabinet accommodates metering transformers and relays, a telephone being mounted in a convenient position. Current for both the supervisory equipment and the circuit-breaker tripping mechanism is supplied by a 30-V, 20-Ah battery.

The Control Station

All the apparatus at the control station, with the exception of the telephone, is fitted inside the control cubicle on the front of which are mounted a number of panels each associated with a sub-station and carrying rotary keys representing the oil circuit-breakers and lever type keys designated "station select," "voltmeter," "ammeter," "tap raise," and "tap lower." Adjacent to each key is an associated lamp, while a large red station lamp is mounted at the top of the panel. The knobs of the rotary keys are designed to form part of a diagram painted on the panels to represent the h.p. ring main, the l.p. bus-bars and the switching arrangements.

When a breaker has been operated, either automatically or manually, the control engineer's attention is drawn to the cubicle by a loud-ringing bell, while the glowing of the red lamp on the particular sub-station panel on the cubicle indicates that a change is to be signalled from this sub-station. The engineer operates the "station select" key on this panel, which extinguishes the lamp and causes the calling sub-station to be connected to the control point in readiness for the indication.

Adjusting the Mimic Diagram

This connection is effected on a system of selection carried out automatically by the control apparatus and a check on the correctness of the selection is given. The apparatus automatically compares the position of each circuit-breaker at the selected station with the position of the corresponding rotary key on the control panel, and on encountering the discrepancy due to the operation of the breaker the lamp adjacent to the appropriate rotary key lights, continuing to glow until the key is changed. By responding to the lamp indications the control officer brings the mimic diagram into complete agreement with the conditions of the distribution system and then restores the "station select" key.

The tap changing of transformers is under the control of the engineer and is effected by operating the appropriate keys on the control panel. To change the tapping the sub-station is selected by operating the "station select" key, the station lamp glowing to indicate correct selection, and then the "tap raise" or "tap lower" key is operated, as desired, to cause an appropriate contactor at the sub-station to be selected in readiness for operation. The lamp adjacent to the key operated glows, indicating that the supervisory equipment has made the correct selection at the sub-station.

A key designated "operate" is provided on the top panel of the control cubicle, and this is depressed to operate the contactor at the sub-station, causing the tap changing switch to take one step. After a tap change has been made it is not necessary to perform any further operation to read voltage, since the voltmeter on the control panel is automatically associated with the bus-bars on which the voltage is being varied. On restoring the "operate" key the voltmeter is disconnected and a numeral on a glass screen is illuminated from behind to indicate the position of the tap switch. If the voltage is not of the desired value the "operate" key is again depressed, causing the tap switch to take a second step and the voltage to be indicated. Adjustment of the bus-bar voltage is thus effected merely by depressing the "operate" key, restoration each time resulting in an indication of the tapping being given.

At any time the bus-bar volts or the load on a transformer may be read on the appropriate meter. Selection of the particular sub-station is made by means of the "station select" key, and a "voltmeter" or "ammeter" key is depressed as required. The station lamp glows and the lamp adjacent to the key operated lights to indicate correct selection. When this condition obtains a key adjacent to the meter is operated to connect the meter in circuit and the required reading may be then taken. Full co-ordination of the stations is completed by providing telephone communication over the pilot wires.

We are indebted to Mr. R. Ayton, M.I.E.E., city electrical engineer and manager, for permission to publish the accompanying illustrations and the above information.

The B.S.I. Handbook

The British Standards Institution has issued its half-yearly handbook which includes the annual report for 1934-35, presented at the last annual general meeting, as well as the indexed list of current British Standard Specifications. The report on the activities of the three divisions—engineering, building and chemical—provides interesting reading and shows the great amount of valuable work voluntarily carried out by the Institution's 700 technical committees. Sections setting out the current list of B.S. Specifications, and those in course of preparation are followed by a complete subject index. This index should be in the hands of all technical and purchasing departments of public authorities and firms throughout the country who find the Specifications of considerable assistance in the preparation of contracts and tenders. Copies of the new Handbook (reference CD. 7000), are available from the Institution's Publications Department, 28, Victoria Street, London, S.W.1, price 1s. 4d. post free.

Electricity in Mines and Quarries

The Inspector's records and observations

THE annual report of H.M. Electrical Inspector of Mines, Mr. J. A. B. Horsley (H.M. Stationery Office, 2s. net) reveals that in 1934 the number of mines at work decreased by three to 2,123 and the number using electricity decreased by eight to 1,328. Motors installed above ground increased by 22,888 to 927,082 h.p., and those used underground by 37,696 to 1,022,104 h.p. The annual increment was 23,000 h.p. above and 38,000 h.p. below ground.

The number of motors in use above ground rose by 723 to 21,032 and those underground by 1,396 to 24,310. The increase in h.p. during 1934 was unusually large, being 60,584 h.p. as compared with 33,340 h.p. for 1933. The most notable increases above ground were 5,397 h.p. for winding, 8,295 h.p. for coal cutting, and 6,486 h.p. for miscellaneous purposes.

Below ground there were increases of 5,506 h.p. for pumping, 6,703 h.p. for coal conveying, 8,507 h.p. for haulage, and 13,291 h.p. for coal cutting, excepting only North Wales where cutting h.p. fell by 348. The biggest individual increases were 3,450 h.p. in Northumberland, 2,816 h.p. in Durham, and 1,710 h.p. in South Yorkshire.

There was a decrease of 2,710 h.p. in the use of d.c. in Scotland and the Northern and Yorkshire areas, and a d.c. increase of 3,137 h.p. elsewhere, the net d.c. increase being 427 h.p. In all divisions a.c. increases totalled 60,157 h.p., While the use of d.c. is slowly decreasing the increase in the use of a.c. is progressive.

No Accident Increase

The number of accidents inevitably fluctuates, but there is no definite increase following on the steady growth of the use of electricity. The average number has been 60.8 during the last six years, as compared with 65.3 in the preceding six years, with an average decrease in non-fatal and no change in fatal accidents.

The report shows that in the period 1925-1934 there were 104 fatal and 494 non-fatal accidents due to electrical causes in which 180 persons were killed and 589 injured. In 1934 there were fifteen accidents involving the loss of twenty-one lives, ten of which were the result of shocks—about the same as in 1933. With two exceptions all these accidents occurred below ground.

Mr. Horsley has often pointed out that earthing the metal casing of electrical apparatus is not by itself a sufficient or complete insurance against danger. He considers it necessary to secure by means of suitable automatic cut-outs that the circuit in which failure of insulation occurs shall be isolated at once. An analysis of accidents during twenty years reveals that 34 per cent. of all the fatal accidents, or 41 per cent. of those due to shock, arose from contact with metal that was not part of the electric circuit.

The sixty-two reportable non-fatal accidents and dangerous occurrences (forty-nine below ground) compare with forty in the previous year. Of the instances selected for detailed description in the report, one involved shock at 74 V a.c. and another illustrates the limitations of automatic safeguards as applied to remote control systems.

Causes of Accidents

Uncertified signalling bells are still to be found in safety lamp mines and in several instances steel tape armoured cables have not complied with the requirements with respect to conductance of the metallic covering. Neglect of regular testing of electrical circuits is still a common cause of complaint, as is also the improper repair of trailing cables used with underground machinery.

During the last ten years 45 per cent. of the fatal accidents and 38 per cent. of the non-fatal accidents have been associated with the use of trailing cables and plug connectors. During 1934, such accidents represented 40 and 45 per cent. respectively, being an increase from 21 to 33 by comparison with the preceding year.

It is stated that 515 of the accidents which have occurred in the mining industry in the last ten years were due to shock, thirty-two to fire below ground, thirty-one to the ignition of firedamp, and twenty to other causes, all due to the use of electricity. Of those involving loss of life eighty-two were due to shock, seventeen to the ignition of firedamp, three to fires arising from electrical defects, and two to other causes. In twenty-seven cases the contributory cause was unsuitability of apparatus or design, in twenty-two installation or maintenance defects, in twenty misuse, negligence, or ignorance, and in seventeen organisation and lack of equipment, while eighteen were "unforeseeable," which does not imply "unpreventable," but that they were not directly due to carelessness.

Mr. Horsley protests against the unnecessary use of unarmoured flexible cables and free plugs for temporarily fixed apparatus. Pliable armoured cable and bolted plug couplings ("flit plugs") will meet practical needs.

Greater Machine-won Output

There was an increase of 240 (almost exactly the same as in 1933) in the number (4,457) of electrically-driven coal cutting machines used. Similarly, there was an increase of nearly 11¼ million tons in the quantity of mineral cut by electrical machines (73.973 million tons) out of a total increase of nearly 16 million tons of mineral got by machine mining (103.903 million tons, or 45.9 per cent of the whole output). In two divisions only did the electrically-cut output decrease, namely, in the Cardiff-Forest of Dean and Midland-Southern areas.

Scotland still leads in the use of electricity for coal cutting. This should be borne in mind when considering the incidence of accidents, for it is really only at the coal face, or in its vicinity, that the safe use of electricity is not comparatively easy.

The feature of technical interest in electrical machine mining is the growing use of remote control. That is to say, the starting and stopping of the machine is done by a switch in the gate road, controlled electro-magnetically by means of a pilot conductor in the flexible cable, from a master switch in the machine. This development contributes to safety as well as to efficient operation.

Conveyors and Loaders

The number of electrically-driven conveyors and loaders increased by 466 to 3,365, which is fifty more than the preceding year's increase. There was an increase of nearly 11¼ million tons of coal conveyed wholly by electrically-driven machines (48.248 million tons) out of a total increase of 19¼ million tons of coal conveyed by mechanical means (81.493 million tons, or 36 per cent. of the whole output).

The Swansea division was the only one which did not increase its use of electric conveying. In this respect also Scotland leads. Remote control is being adopted for conveyors, but mainly on the score of convenience, for with the smaller loads dealt with there is not the same difficulty in finding room for a switch of adequate capacity embodied in, or attached to, the machine itself.

Metalliferous Mines

Two accidents only (non-fatal) were reported from the use of electricity in metalliferous mines. One of them shows what a mistake it is to earth the metal guard of a non-metallic hand lamp. Mr. Horsley considers the proper course to adopt for such lighting circuits is to provide a separate lighting transformer with a line voltage of not more than 110 V and having the mid-voltage point or the neutral earthed.

Motors installed in metalliferous mines increased by 3,064 h.p. to 22,853 h.p. above ground and by 1,202 h.p. to 15,401 h.p. below ground. The greatest use on the surface was 8,340 h.p. for driving air compressors, 6,703 h.p. for dressing and cleaning plant, and 4,034 h.p. for winding, while below ground 11,108 h.p. was used for pumping. The greatest installed h.p. (15,494) was in the Northern area, followed by 9,208 h.p. in the North-Western and 8,534 h.p. in the Midland areas.

Quarries' Good Record

In view of the considerable number of quarries at which electricity is used and considering the substantial total h.p. of motors installed, the freedom from electrical accidents at quarries is remarkable. One only (non-fatal) was reported in 1934. The number of quarries at which motors were installed reached 1,050, of which 410 were in the Midland area and 153 in the North Midland area. The h.p. of motors installed consisted of 108,327 a.c., 27,199 d.c., and 8,595 mixed, an increase of 11,159 h.p. since 1933.

During 1934 the number of electrical inspections made at mines totalled 526 underground and 497 at the surface, in addition to 88 at quarries.

The Mines Department's testing station at Buxton is to increase its staff, having been fully occupied. Excluding duplicates and variations, the apparatus certified as flameproof during the year (137 items) included the following: induction motors 35 (one d.c. motor only), air-break switchgear 41 (four oil immersed), lamp fittings 13, plug and socket couplers 9 and cable coupling boxes 6.

While most certificates are required for colliery apparatus, there is a steady flow of applications for the certification of appliances for other industrial uses.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

An Unusual Hydro-electric Station

The accompanying picture was taken during a recent tour in the South of England and appealed to me as being a fine example of invention, practical engineering, and sound economics, besides indicating the lengths to which people will go to obtain electric lighting in their homes in preference to other sources of illumination.

So far as could be seen, without a very detailed inspection, the car body, mounted on a brick and concrete foundation, still houses the original gear-box and lighting generator and at the same time provides accommodation for one or more sets of accumulators. The water-wheel seen in the left-hand bottom corner is one of the car wheels fitted with paddles, the water being suitably directed by means of the pipe-line seen running along the bed of the stream. The water-wheel is apparently connected to the gear-box by means of a series of shafts and car type universal joints, one of which can be seen entering the brickwork immediately in front of the car body.

A strange hydro-electric undertaking

Driving the generator and charging the battery of accumulators is a simple matter, but the ultimate sight of power transmission lines passing up on poles from the car body to the owner's house was decidedly intriguing, and it is regretted that this could not be included in the photograph.

A long spell of fine weather and drought prevented this ingenious equipment from being seen in actual operation, but, judging from the very excellent state of repair in which everything was kept, there seems no reason to doubt that the installation is as practical as it is unique and no doubt amply repays the designer during the long winter evenings.

August 16th. E. W. B.

Salaries and Grading

The comments by Mr. E. Salmon in your issue of August 16th are certainly timely and they are supported by a recent advertisement in the electrical Press inviting applications for a temporary canvasser at a salary of £3 per week. I am more concerned with a grading scheme governing salaries and conditions for development assistants and canvassers—a role which I myself am filling. There are already enough interests "protecting" station and distribution engineers, and even chief engineers have scales of salaries recommended by the I.M.E.A. for adoption by local authorities, while lady demonstrators have their standard of employment set for them by the E.A.W.

It is quite evident from the princely salaries offered by supply undertakings that even to-day there are scores of borough electrical engineers who are not fully conscious of the very important domestic business that can be obtained by really enterprising "business getters." On the contrary, administrators of the type of Mr. C. R. Westlake, of Northern Ireland, place domestic development, and the men who can influence it, on a high plane.

But as appreciative engineers (from the point of view of salary inducements and conditions of employment) are apparently so few and far between, it becomes an urgent necessity that some association should evolve at once, to look after the interests of sales staffs. If an average of three members only could be secured from each of the 615 distributing undertakings in this country I feel sure that this would be a good beginning and would secure representation and recognition in the right quarter.

I had the impression—perhaps mistakenly—that E.D.A. had an idea for dealing with this problem, but as nothing has come forth in the way of a solution from 2, Savoy Hill (suggestions have been plentiful enough!) I imagine the matter has been pigeon-holed and will be brought to light and dusted some other day when the people concerned have taken the remedy into their own hands. A. V. C.

Reading, *August 19th.*

In his letter printed in your last issue Mr. E. Salmon raises the question of the position of the canvasser, the development assistant, and the showroom assistant, three positions which hardly come within the scope of the E.P.E.A. Doubtless many such positions are filled by men who are qualified for membership of the E.P.E.A., but this is not usual. I do not know of an association that deals with such positions unless, possibly, it be the Electrical Trades Union.

"Power Engineer" says that he cannot entirely agree that there is difficulty in grading the charge engineer; he thinks that in stations of equal capacity the duties should not vary. But in actual fact such duties *do* vary. Much depends on how a station is staffed, this particularly in the boiler house. In some stations the charge engineer has practically no assistance, while in others there are boiler house specialists and/or assistant engineers: in these two cases the responsibilities and duties of the charge engineers are hardly similar.

The whole point is that the charge engineer of to-day is a very different man from the man of comparatively few years ago, and that he should be graded above Grade 8 is admitted by all thinking engineers. "Power Engineer" suggests the placing of the charge engineer in a higher grade as a solution of the problem of fitting in, say, the boiler house engineer and assistant charge engineer; with this I am inclined to agree, but I cannot agree that there need be any clash with engineers of other departments.

The position of a charge engineer in a station which has ceased to extend is one of the hardships brought about by the inception of the grid, and I fail to see how such engineers can expect to get any advance in classification, if the increase in demand is carried by the grid. These men will not "view the grid as a beneficial proposition," but we must stop thinking parochially, and remember that the individual is a mere cipher in the scheme, hard though it may sometimes be.

Your correspondent says that in two years' time the schedule will become obsolete. I would go farther than this and say it is hopelessly out of date already.

So long as we have men engaged in the industry who fail to join the E.P.E.A. just because they are in receipt of a good salary and their position is not definitely graded or their duties defined, we shall never have a strong professional asso-

The construction of the new Fulham power station is proceeding rapidly. The boiler plant is nearly completed and the installation of the switchgear and turbine plant is well in hand

ciation—one that can grade, and define the duties of, every position of importance in the electricity supply industry.

There is a possibility that the Commissioners may, in time, take over the generation of electricity and organise a Generation Department; then, possibly, a definite staffing scheme will be drawn up and put into operation with fixed duties and salaries for all stations. Many new positions would be established to suit present-day power station conditions. The E.P.E.A. should take the lead and not leave it to the Commissioners to act as they must and will do if the only professional association extant has to negotiate on the lines of a schedule hopelessly out of date, incomplete, and not approved by its members. D. SHIPTON WOOD.

Preston, *August 19th.*

When will the E.P.E.A. wake up to the dissatisfaction felt by its sub-station charge engineer members? If the unsatisfactory position due to the revised schedule having no grade comparable with the D.J.I.C. rate of pay for these men in the London area is inevitable, why does not the Association state candidly that it can do nothing to remove the anomaly?

Is the E.P.E.A. going to rely on the efforts of the E.T.U. to obtain the best terms for its London sub-station members indefinitely? LONDON SUB-STATION CHARGE ENGINEER.

August 17th.

"Let's All go All-electric!"

Mr. R. N. Jones's article in your last issue opens up a wonderful vista of possibilities for publicity and propaganda

A recently electrified boot factory at Bristol (See page 263)

which seem to have been sadly neglected. There must be in the main cities and towns many thousands of the rank and file of our industry who are by no means "all-electric" but would willingly be so if they received a little assistance from their employers. I suggest that all supply authorities, manufacturers, consultants, and contractors could well get together and realise that the majority of their respective staffs are people with modest salaries and therefore unlikely to go all-electric on their own initiative. With reciprocative tariffs up and down the country, assisted wiring and deferred terms every, more or less, permanent employé in all and every branch of the industry should be encouraged and expected to be all-electric.

The force of example alone is very strong and there is no better or continuous advertisement medium than the women. They will talk intelligently and forcefully to all their friends who call, whom they meet when shopping or when visiting. The children will also become a potent force, for the girls when taking their cookery lessons at school will rapidly indicate to the teacher how their mother does it at home by electricity and then will follow the introduction of more electric cooking in the schools and centres; this will eliminate some of the suspicion which many young ladies have regarding electricity.

If E.D.A. could be persuaded to produce a comprehensive scheme for submission to all the various trade associations a wonderful development could be achieved *within* the industry during the next twelve months or so.

August 18th. DEVELOPMENT.

A Skilled Man's Plaint

Dealing with the above subject may I say that it is also possible for any person not only to engage in wiring, which greatly surprises Mr. W. Lawrence, but also to get admitted to the Electrical Trades Union, although that person may not be, and in some cases is not, a competent wireman. On the application form for admission to the E.T.U. the applicant is asked, amongst a multitude of questions, where he is employed and what rate he is getting. I have found from experience that if the answers are in order the application is usually granted. The Union does not appear to care whether or no the applicant has served an apprenticeship or passed any examinations such as those of the various Polytechnics or the City and Guilds.

In addition to the above I have known of lads applying to the Union for "mates' tickets from the apprentice stage and have heard it asked why the young man, possibly still under twenty-one, has not taken out a full wiremen's ticket. The reason is obvious: The "mate" does not know sufficient and has not the confidence. I am firmly convinced that in the electrical contracting business there are too many slap-dash and incompetent workmen, some getting the full rate, but the great majority cutting wages anything from 1d. to 6d. per hour. Their motto appears to be, "If it shows, make it passable, if it doesn't then it need not be."

If a job passes the "Megger" test they are satisfied. In the thousands of houses now being jerry built twin 1/.044 rubber is being used without any protection whatsoever. The employers are even paltry enough to economise on white-enamel ceiling rose blocks which cost a penny each. They are also fond of putting jobs out as piece work at so much per point finished work. What wireman will do a decent job under these conditions?

Our trade wants overhauling from top to bottom and only we ourselves can do it. I could write far into the night of the wrong things that are done and of the I.E.E. Rules that are evaded. Where will it all end? How many more people will receive fatal shocks due to rotton material and workmanship? When will everybody be registered, including employers? STUDENT WIREMAN.

August 16th.

The B.B.C. and Radio Manufacture

Upon opening my newspaper this morning my eye catches the following paragraph placed before the Ullswater Broadcasting Committee by the National Council of Labour:

> "The Council is also of opinion that the new charter should empower the B.B.C. to undertake the manufacture and sale of wireless sets and equipment."

The menace of such an event to the radio industry is surely obvious. I have always maintained that the B.B.C. is already exceeding its powers by offering radio advice and instruction to owners of radio sets, including school and educational bodies over the public radio service. The B.B.C. has no right to trade or dabble in private radio business.

It is high time that the radio industry put the B.B.C. in its proper place and saw to it that this body carried out only its legitimate functions. There are now a number of qualified radio engineers all over the country whose legitimate work is to service radio installations and advise the public on all radio matters.

The obvious result of the paragraph herein quoted would be to actually "nationalise" the radio industry, and the National Council of Labour to be logical should go the whole way and recommend that all and sundry now engaged in the radio business should automatically become public servants and swell the staff of the B.B.C. accordingly.

Gloucester, *August 19th.* HERBERT W. HAYDON.

The I.E.E. Regulations

Having turned up Section 6 of the Electric Lighting Act of 1882 I find nothing to support the statement of Mr. J. W. Thomas that the Electricity Commissioners have power to make the I.E.E. Regulations enforceable.

This Section begins: "The undertakers shall be subject to such regulations as may be inserted in any licence, Order or special Act affecting their undertaking with regard to the following matters . . . . " and deals entirely with the duties of undertakers. The last paragraph of the section gives powers to local authorities to make bylays for securing the safety of the public, subject to confirmation by the Board of Trade. It is quite clear that the object of such regulations and by-laws was to secure the safety of the public from any danger that might arise from works carried out by the authorised undertakers in exercising the powers conferred on them.

The freedom of the consumer to make whatever use he pleases of the supply is specially safeguarded in Section 18 of the same Act. "The undertakers shall not be entitled to . . . . in *any way control* or interfere with the manner in which the electricity supplied by them under this Act or any licence, Order or Special Act is used." The only restriction on this freedom of the consumer is that he may not deal with his supply in any manner "so as to unduly or improperly interfere" with the supply to any other consumer.

Westminster, S.W.1, *August 16th.* C. H. HIRD.

Extensive Illuminations at Southend

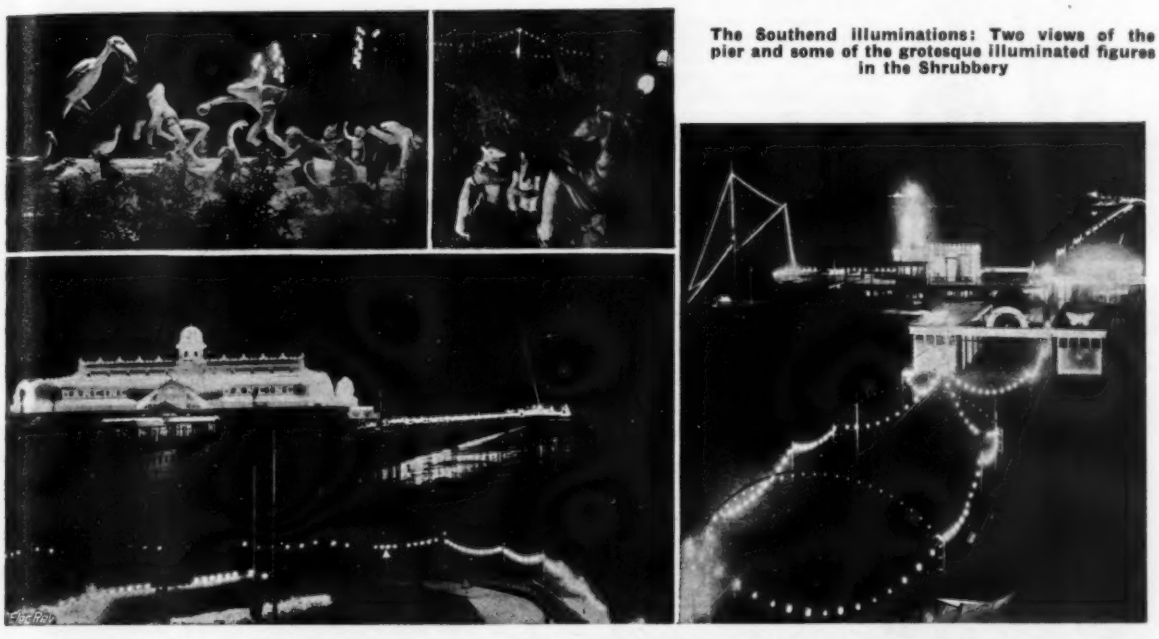
THERE was a time when the best illuminations were those with the most light, and the brighter they were, the better they were supposed to be. Now the novelty of municipal illumination has worn off a higher standard of artistic quality is called for, and in this Southend can justly be said to be leading the way. In the scheme inaugurated last Monday by Sir Harry Brittain, gone is all the dazzle: instead, a note of originality has been introduced.

After attending the opening ceremony, we wandered around the Shrubbery, there to find many illuminated "set-pieces" with grotesque figures, such as the "Happy Hooligans" and "Winnie the Witch," not forgetting the awful "Wallaballoo" and a charming little scene "The Bedtime Story." Then walking along the Westcliff parade we were entranced by the soft coloured floodlighting of the trees in the Cliff Gardens, the colours changing while we watched. Surely there is nothing to excel the illumination of such natural beauty as this.

Along the Esplanade we found large imitation flowers, three hundred of them actually, an illuminated fountain and an effective flaming pylon, the colours of which changed every few seconds, while on reaching the pier we could see a ship outlined with strip lighting—at least we thought it was until a trip to the end of the pier showed the "ship" to be cunningly outlined on the pier itself! From the pier the town presented a fine panorama, the internally lighted windmill and pillar of light with 700 lamps (44 kW) standing out superbly, while all the time a powerful searchlight played on the water, picking out the anchored boats and occasionally alighting on the old lifeboat moored 200 yards off the shore, now converted into a 40-ft. gondola fitted with 400 lamps.

There are many other tableaux on the front and frequently we came across animated signs, some of those we considered the best showing animals playing games, a butterfly "flying" and a train in motion.

Actually the illuminations, which cost £17,300, extend from the Chalkwell Esplanade to the Kursaal, up the Pier Hill and along the Royal Terrace to Westcliff Parade, a total route distance of 2¼ miles (excluding the Pier). Over 35,000 lamps are in use with a total load of 1,000 kW, and it is to Mr. A. C. Johnson, the borough electrical engineer, that the credit is due for the organisation. The illuminations will continue until October 20th.



The Southend illuminations: Two views of the pier and some of the grotesque illuminated figures in the Shrubbery

The Italian Electrical Industry

BEARING in mind that not all the Italian industries using electricity were working at full pressure during 1934, the situation during the year may be regarded as satisfactory. The output of supply authorities was roughly 11,884 million kWh which, with 206 million kWh imported, brings the total requirements up to 12,090 million kWh, as compared with 11,239 million kWh in 1933. It should not be forgotten, however, that during the year an intensive effort was made to bring down the cost of living, and that the price of electricity was reduced so that the increased output has not turned in some cases into a financial benefit for the electricity suppliers. On the other hand the higher output has in many cases compensated for the reduced charges. For instance, the sales of the Società Meridionale di Elettricità of Naples increased by 10 per cent., reaching for the first time a level exceeding one milliard kWh, the accounts showing a profit of 63,868,000 lire against 55,969,000 lire during 1933. Many of the smaller concerns have been absorbed by the larger ones, thereby reducing operation costs. It is claimed that the soundness of the financial policy of the industry is confirmed by the fact that the Società Idroelettrica Piemonte (SIP) of Turin, which in 1932-1933 had been financially reorganised with State assistance, made a net profit of over 6,000,000 lire in the past year, allowing the payment of a dividend of 4 per cent.

With regard to the prospects of an increase in the consumption of electricity as a result of further railway electrification, it is felt that while there is no doubt that highly satisfactory results have been obtained through the electrification of the large Italian lines such as those from Modane to Turin, Genoa and Leghorn, from Bologna to Florence and from Naples to Salerno, it is still doubtful whether under the present conditions electrification is justified in the case of shorter lines. As a matter of fact, on a section of the Naples to Villa Literno line, the electric trains have been replaced experimentally by petrol railcars. On other small railways in the Northern service Diesel traction has replaced steam or else bus services have been instituted.

Large schemes of electrification are, however, proceeding, and by November next the Florence to Arezzo, Rome, Formia and Naples, and the Tarvisio to Udine lines are expected to be completed. When the electrification of the Florence to Naples railway is finished Italy will have one of the longest electric railways on the Continent, the whole line from Bologna to Florence, Rome, Naples and Salerno measuring 682 km. Further; when the line has to be electrified as far as Reggio Calabria, which has been authorised, the total distance will be 1,102 km.

The electrification of these lines necessitates a complete reconditioning of the signals, telephone and telegraph services for which only underground cable is used. Electric streamlined trains under construction at the works of the Società Anonima Italiana Ernesto Breda of Milan, are understood to be similar to the Diesel streamlined trains built in America and to have three traction motors of 1,000 h.p. each, ensuring service speeds of 160 km. per hour.

A Kaplan Memorial

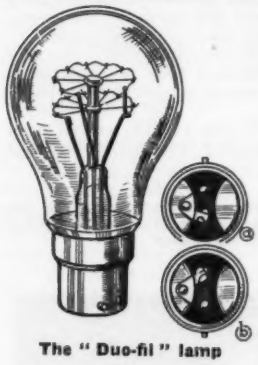
The Austrian Institute of Technical History Research of Vienna has lately appointed a special committeee to compile a biography of the late Herr V. Kaplan, the inventor of the hydraulic turbine which bears his name. In addition to a description of his life, it is proposed to collect together his various books and technical articles, and to present a bust statue or photograph of him to the Technological Museums of Vienna and Munich. Kaplan, who was born in 1876 and died in 1934, was first associated with Ganz & Co. of Budapest and later was Professor of Machine Construction at the Ecole Polytechnique, Brunn, it being here that he designed the Kaplan turbine.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Double-filament Lamp

At the same price as an ordinary single filament lamp, the BRITISH ELECTRYDE CORPORATION, LTD., 110, Drury Lane, London, W.C.2, has placed on the market a lamp with two filaments, both of the same rating. During a demonstration of this lamp it was pointed out that the switch arm at the base of the lamp for connecting one or other of the filaments cannot possibly cause a short-circuit, while each filament is guaranteed to last a thousand hours. It was also claimed that tests have shown the burning of one filament to have no adverse effect upon the unused one.



The "Duo-fil" lamp

Bayonet-cap lampholder adaptors are used for sizes up to and including 100 W, and the screw type for the 200, 300 and 500 W sizes, while traction-type lamps are also produced.

Heat Therapy

A number of new developments in apparatus for the therapeutic use of radiant heat are included in a catalogue issued by the MEDICAL SUPPLY ASSOCIATION, LTD., 167, Gray's Inn Road, London, W.C.1, which also includes a great deal of useful medical information. There is a new type of radiant heat hand-lamp designed so that the whole weight of the bulb holder and the bulb is carried by the back casting, which is fixed to the handle, and thus no extra weight falls on the nickel-plated copper reflector. Model H.T.717 is a new standard radiant heat unit designed for both general and local treatment. It comprises a 1,000 W special tungsten filament bulb with a large parabolic reflector supported from a forked bracket arm and held by a sliding collar working vertically on the upright. The movement is obtained by rotation of the collar and by the swivel at the end of the forked arm, height adjustment being facilitated by the counterweight system. A detachable front localiser is fitted to the main reflector by three brackets, while for chromo-therapy red, blue and amber colour filters are provided.

An "Emesay" head bath and folding bath

There is a new folding radiant heat bath which forms a neat and compact outfit, while a head bath has also been introduced. A suspension infra-red unit designed for confined spaces has a parabolic reflector carried by a stirrup suspended from a steel cable counter-weighted and held in position by a telescopic wall bracket arm.

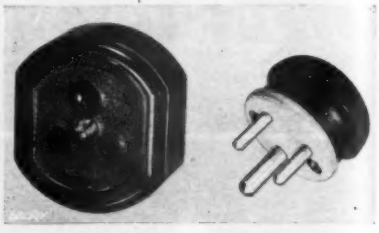
The type H.T.703 radiant heat hand-lamp

Five radiating elements are employed in the new multiplate infra-red unit; all are individually adjustable and enable the unit to be used for the even irradiation of surfaces such as the back, or the plates can be so positioned to encircle half the body. The loading is 2,500 W. Two other new lines are a table model "Discus" infra-red generator having a circular plate type of element in a parabolic reflector with full angulating movement, and a complete range of eleven different sized infra-red tunnel baths. Production of the latter has been delayed by the difficulty of obtaining an element giving an adequate yet even radiation throughout the whole length of the bath. Each model in the range is available in two types, namely, the "Normal," including asbestos lined walls, horizontal switch and series-parallel switch, and the "Special H," which is built on more robust lines and is designed for hospital and institutional work. The various models include baths for the hand, elbow, knee, foot, &c., as well as the more familiar "tunnels."

Both the "Paraf-Electro" compress, comprising an electrically heated pad having a medicated paraffin wax content, and the collapsible stands for radiant heat and infra-red units are newcomers, while redesigned products include the floor standard "Radiobeam" radiant heat apparatus, "Grosvenor" infra-red generators, electric wax baths and the Murray Levick type chromo-therapy lamp.

Small Bakelite Accessories

Among a number of new accessories which have just been placed on the market by HENDERSON'S WHOLESALE ELECTRICAL & RADIO, LTD., Electric House, Queen's Road, Brighton, are a new 2-A three-pin plug and socket which complies with the new 10th edition of the I.E.E. Regulations, and a bell transformer in a bakelite case, also complying with the rules. The latter is mounted on a porcelain base and has fuses in both the primary and secondary circuits, voltage of 3-5-8 being obtainable from an input of 200/250 V a.c.



The new Henderson 2-A plug and socket

Radio Testing Instruments

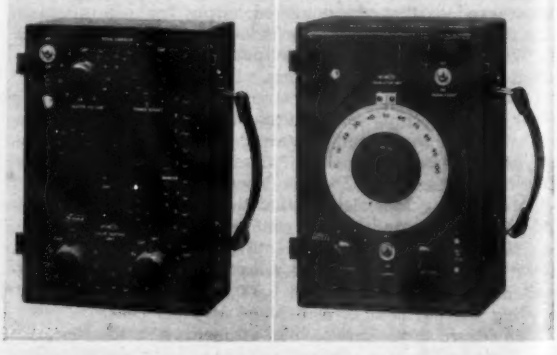
The series of testing instruments for the radio trade which is marketed by WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17, includes a portable oscillator in the form of a shielded signal generator covering by fundamental frequencies the entire broadcast and intermediate frequencies used by modern receivers. The output is calibrated in microvolts at 1,000 kc. The instrument is self-contained and complete with power supply, while the audio-frequency output is entirely independent of the radio-frequency generator and may be used to check audio-frequency amplifiers.

A portable precision multi-range instrument, directly calibrated, having a 3¼-in. dial and moving-coil meter, permits twenty-one different ranges of measurement. The sloping case facilitates reading, and the meter has a very low-range ohms scale, and a seven-point rotary range selection switch.

There is also an instrument for testing all types of valves. It is independent of the receiver, the set being operated from a.c. mains. All multiple-valve diode sections, as well as full- and half-wave rectifiers, come within the scope of the instrument, while another feature is provision for measuring the voltage across any pair of valve pins or the emission of any electrode under working conditions.

A new wavemeter of the absorption and radiating type is capable of sending out a signal of known frequency to check short-wave sets, or of indicating accurately the frequency of an unknown transmitter by absorption and lamp indication.

The company has introduced a compact multi-range meter of the moving-coil heavily damped type, incorporating a Westinghouse instrument rectifier and indicating a.c. voltages on a separately calibrated scale. The voltage ranges are 500 ohms per volt and the meter takes only 2 mA for full-scale deflection. There are ten ranges, including a very low resistance scale down to 0.5 ohm. The meter is small enough to be slipped into the pocket.



The Wright & Weaire valve-testing unit and oscillator

British Overseas Electrical Trade

Best export figures since January

LAST year we commented upon the substantial expansion in our electrical export trade during July, namely, 26 per cent., compared with the corresponding month of 1933. Now we are pleased to be able to record a further 25 per cent. improvement. The Board of Trade returns for last month reveal that the total value of electrical equipment shipped overseas was £1,128,536, which is the highest amount recorded since the first month of the year, and compares with £902,024 in July, 1934, though it is necessary to take into account that this year July contained 27 working days, against 26 in the corresponding month of last year. Nevertheless, it will be seen that there has been quite a considerable advance. Compared with June, exports were up £122,709, or 12 per cent., but the comparison is affected by the fact that there were only 24 working days in that month.

The most pronounced rise was in the goods and apparatus section. Exports in this category were the highest so far this year. Shipments of radio and telephone apparatus were especially good, exceeding those of July, 1934, by approximately £103,000, or 57 per cent. Exports of wires and cables were also better than for several months past.

Concern may be felt at the large decline in the motor class. Admittedly the figures are low, and have been in recent months, but the comparison is rather misleading in view of the fact that the exports in July last year were 142 per cent. higher than in the corresponding month of 1933, due chiefly to some large orders from South Africa. At the same time, the continued rise in imports of motors is not reassuring. The tone of the machinery market was maintained in other directions, converting and transforming plant exports being higher than in any month either this year or last year, and probably since pre-depression days.

Turning to the destinations of goods and apparatus it is seen that exports to South Africa continued to hold first place with £140,590. Very gratifying are the figures for Australia (£123,048), which are far ahead of any month for a long time past. From the point of view of proportional increase, Hong Kong and France are to the fore. In our last issue we referred to electrical developments in Malaya, particularly in the tin mining industry. Our manufacturers are evidently deriving benefit from this boom as the figures show an improvement of £10,427 in our machinery exports to that country. Further large orders from Malaya are likely in the near future.

The principal destinations of the more important items in the goods and apparatus section were as follow, the July, 1934, figures being in parentheses :—

Rubber insulated wires and cables :—Australia, £26,716 (£18,188); South Africa, £17,768 (£14,799); British India, £12,478 (£16,140); New Zealand, £5,284 (£3,078); other British countries, £10,935 (£10,237); foreign countries, £7,728 (£6,853).

Electric wires and cables (insulation other than rubber).—South Africa, £28,183 (£19,546); Australia, £25,558 (£17,108); British India, £16,999 (£20,896); other British countries, £12,830 (£6,078); foreign countries, £14,961 (£14,585).

Telegraph and telephone apparatus (not radio).—South Africa, £35,320 (£14,248); Australia, £24,289 (£14,901); Argentina, £20,331 (£6,883); Canada, £3,128 (£571); other foreign countries, £53,175 (£41,929); other British countries, £15,643 (£12,284).

EXPORT AND IMPORTS DURING JULY

	Exports. July, 1935.	Exports. Inc. or dec. compared with July, 1934.	Imports. July, 1935.	Imports. Inc. or dec. compared with July, 1934.
Submarine telegraph and telephone cables ...	£346	— £2,160	*	—
Telegraph and telephone wires and cables (not submarine)	37,401	+ 5,715	*	—
Other insulated wires and cables	179,440	+ 31,932	£16,522	+ £3,112
Radio receivers (not radiograms), excluding valves ...	11,887	— 2,141	20,774	+ 10,467
Radio transmitters (excluding valves)	24,117	+ 15,153	*	—
Radio valves	38,111	+ 9,321	12,346	+ 5,225
Other radio parts and accessories...	56,055	+ 19,659	68,802	— 1,442
Telegraph and telephone apparatus (other than radio) ...	151,886	+ 61,070	*	—
Electric carbons	*	—	7,131	— 12,809
Incandescent lamps	49,113	+ 3,455	9,388	— 4,854
Other lighting apparatus ...	39,980	+ 12,340	29,588	— 10,910
Primary batteries	12,916	— 2,151	550	+ 400
Accumulators	51,310	+ 17,011	*	—
House service meters	10,521	— 2,656	*	—
Other electrical instruments...	19,457	+ 4,799	20,891	— 3,862
Unenumerated electrical goods and apparatus ...	127,951	+ 17,857	63,542	— 4,742
Electric generators up to 200 kW.	24,606	+ 9,720	*	—
Electric generators over 200 kW.	34,737	+ 7,141	*	—
Electric motors	73,226	— 45,921	16,874†	+ 3,992
Convertors and transformers...	63,041	+ 29,742	*	—
Starting and controlling gear for motors	28,343	+ 11,843	*	—
Switchgear	82,088	+ 21,746	*	—
Other electrical machinery ...	12,004	+ 3,037	15,484	— 598
Electrical vacuum cleaners ...	*	—	32,527	+ 19,202
Total	£1,128,536	+ £226,512	£314,419	+ £3,181

* Not classified separately. † Not railway and tramway motors.

With regard to imports, the total value of £314,419 was £3,181 (1 per cent.) in excess of the figures for July, 1934. This amount was well above that in any recent month, but the general tendency was for the values to fall off compared with July last year. An increase of £19,202 in imports of vacuum cleaners, principally from Canada, was largely responsible for keeping the figures up.

The following analysis shows the source of electrical imports into this country :—

Electrical goods and apparatus.—United States, £81,091 (£42,769); Germany, £56,833 (£70,689); Netherlands, £44,587 (£64,804); Switzerland, £16,251 (£17,928); Belgium, £8,124 (£4,793); France, £6,985 (£17,563); Austria, £5,093 (£3,202); other foreign countries, £19,785 (£32,852); British countries, £10,785 (£14,349).

Electric vacuum cleaners.—Canada, £18,849 (£6,083); Sweden, £4,845 (£3,813); United States, £4,552 (£1,926); Germany, £1,900 (£75); other foreign countries, £2,375 (£1,428).

So far this year our exports of electrical equipment have amounted to £7,473,341, as compared with £6,040,345 in the corresponding period of 1934, representing an increase of £1,432,996, or 23 per cent. Imports have amounted to £1,905,497, as compared with £1,915,985, showing a decrease of £10,488, or 0.5 per cent.

BRITISH ELECTRICAL EXPORTS IN JULY

Destination	Goods and apparatus, July, 1935.	Inc. or dec. compared with July, 1934.	Electric generators, July, 1935.	Inc. or dec. compared with July, 1934.	Motors, July, 1935.	Inc. or dec. compared with July, 1934.	Other electrical machinery, July, 1935.	Inc. or dec. compared with July, 1934.
Irish Free State	£33,338	+ £11,709	*	—	*	—	*	—
Union of South Africa	140,590	+ 34,878	£2,654	— £20,546	£23,014	— £33,152	£48,048	+ £10,282
British India	82,050	— 6,135	16,804	+ 12,472	13,267	— 719	32,864	+ 3,415
British Malaya	14,337	+ 1,096	*	—	*	—	12,986	+ 10,427
Ceylon	6,459	+ 1,993	*	—	*	—	*	—
Hong Kong	24,141	+ 21,341	*	—	*	—	*	—
Australia	123,048	+ 35,288	4,797	2,073	7,998	+ 2,806	6,318	+ 1,359
New Zealand	37,589	+ 8,527	*	—	2,482	+ 854	10,246	+ 7,857
Canada	7,293	+ 2,333	699	+ 620	2,475	— 186	1,997	— 1,428
Other British Countries ...	64,615	+ 30,776	14,986	+ 12,764	11,166	+ 5,285	26,340	+ 16,297
Sweden	12,144	— 7,943	*	—	*	—	*	—
Denmark	17,257	+ 9,988	*	—	*	—	*	—
Belgium	10,366	— 588	*	—	*	—	*	—
France	22,051	+ 12,582	*	—	*	—	1,942	— 91
Spain	10,607	+ 2,949	*	—	*	—	*	—
Italy	24,161	— 1,897	*	—	*	—	*	—
Greece	4,457	+ 1,193	*	—	*	—	*	—
Egypt	10,782	— 2,967	*	—	*	—	1,874	+ 1,661
China	8,776	— 1,306	*	—	*	—	4,521	+ 393
United States	3,180	+ 1,040	*	—	*	—	*	—
Argentina	36,464	— 55	*	—	1,152	+ 689	856	+ 205
Soviet Union	*	—	—	— 575	116	— 8,334	608	+ 208
Netherlands	*	—	29	— 30	*	—	661	— 541
Other Foreign Countries ...	116,786	+ 34,402	19,374	+ 10,083	11,506	— 13,164	36,215	+ 16,234
Total	£810,491	+£189,204	£59,343	+£16,861	£73,226	—£45,921	£185,476	+£66,368

* Not classified separately.

The 1935-36 Lighting Season

New lamp display and publicity material available to the trade

WITH the approach of the new lighting season the electric lamp manufacturers are preparing their campaigns, and already we have received from some of the leading companies examples of publicity material which they are issuing to the trade.

"Cosmos" Publicity Material

The principal theme behind the design of most of the publicity material of the Metropolitan-Vickers Electrical Co., Ltd., is to spread the idea of better lighting, and the company has prepared a booklet entitled "Brighter Homes" which bears no reference to "Cosmos" lamps on the front cover. The retailer's name is overprinted on a prominent panel. This little booklet contains many useful hints on the correct placing of lamps, suitable fittings to use with them, and the size of lamps for various positions. Prices are shown separately at the end of the book, together with other useful information.

The window display "ties up" with the booklet and illustrates various forms of bad and good lighting with an invitation to step into the shop and get a booklet and advice on lighting gratis. The display is ready wired for three lamps and folds up for easy transit. This year's catalogue is a striking production with a strong cover of orange board with black embossed lettering. The contents are particularly complete, and apart from lamp prices and dimensions include much useful information in the "general" section, including a glossary of lamp and illumination terms.

Other items include an attractive metal showcard of hexagonal shape, a larger hexagonal card with prices of motor bulbs, and a brightly coloured transparency for mounting on the shop door or window, while last year's card with embossed translucent lettering and lamps is again being issued. There is also an electric sign based on the spotlight principle, so that small consumption produces brilliant results. A limited number of illuminated electric clock signs are available, and the "Cosmos" lamp calendar is now ready.

The "Mazda" Campaign

The British Thomson-Houston Co., Ltd., has this season produced a number of new publicity items. The season's catalogue, which is now published, is a colourful and comprehensive booklet, thumb indexed like its predecessors and containing in addition to the numerous types of lamps previously listed, new pages of information and illustrations of fittings for street, flood and industrial lighting. In the lighting equipment section the latest types of B.T.H. street lighting lanterns and floodlight projectors are included. An attractive combination of blue, silver and orange, has been chosen for the cover and the result is a very distinctive background for the well-known figure of the Mazda "Dancing Girl," who again figures very prominently in most of the company's new publicity material.

The "Mazda Lamp Business Guide," a complete though smaller catalogue, is again available. The new folder contains condensed lamp information. Every type of lamp for regular use in the household and for general use has been listed, and each is fully detailed and illustrated. There is a large section dealing with light tubes, and another with lamps for motor cars. The folder is illustrated in colour where suitable, and can be supplied overprinted in quantities for general distribution. A new postcard-sized slip, intended especially for car owners, is devoted to Mazda automobile lamps. Prices and all information concerning these bulbs are conveniently condensed on this card.

The company's latest display material includes a decorative holder for the new folders. This is an effective cut-out standing 15 in. high, and ornamented with the embossed figure of the "Dancing Girl," shaded in tones of flame-pink and a deep blue background. The holder is fitted with a strut, and the folders when placed in the front pocket, help to form part of the design and lend additional colour. "Mazda" coiled-coil lamps appear on the front of the stand. The coiled-coil lamp is also the feature of one of the colourful showcards measuring 20 in. by 15 in., the other is a new presentation of bulbs for all motor cars. The design of the latter is a striking one, with a large bulb as a central motif, and shadowy symbols of traffic signals surrounding it. A larger window-display card 30-in. wide and 27-in. high advertises coiled-coil lamps. The "Dancing Girl" is poised on a lamp and her hand points out the word "Mazda," which is illuminated from behind.

Three examples of the lamp publicity material which is now available: (Top) Metropolitan-Vickers Electrical Co.; (left), British Thomson-Houston Co., Ltd.; and (right) Cryselco, Ltd.

Cryselco Displays

Cryselco, Ltd., has chosen as one of the principal features of its campaign material a window cut-out. This shows a lady holding up a coiled-coil lamp. Behind her is a glazed background of "night" blue, while provision is made for the insertion of an electric lamp which gives a very effective finish to the display. The familiar figure of "Col. Chris Elco" appears in the foreground, which also bears the appropriate slogan "The Beauty of Good Light." On either side of the centre-piece are cut-outs of coiled-coil pearl and opal lamps and enlarged illustrations of the coiled-coil lamp. The predominant colours of the play are blue, green, yellow and red.

The company has also prepared two attractive showcards, one advertising coiled-coil opal, clear and pearl lamps, and the other relating to automobile lamps. On the backs of these is given detailed information in tabulated form of wattages, prices, and other useful particulars.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Tyneside Electric Railway Contract

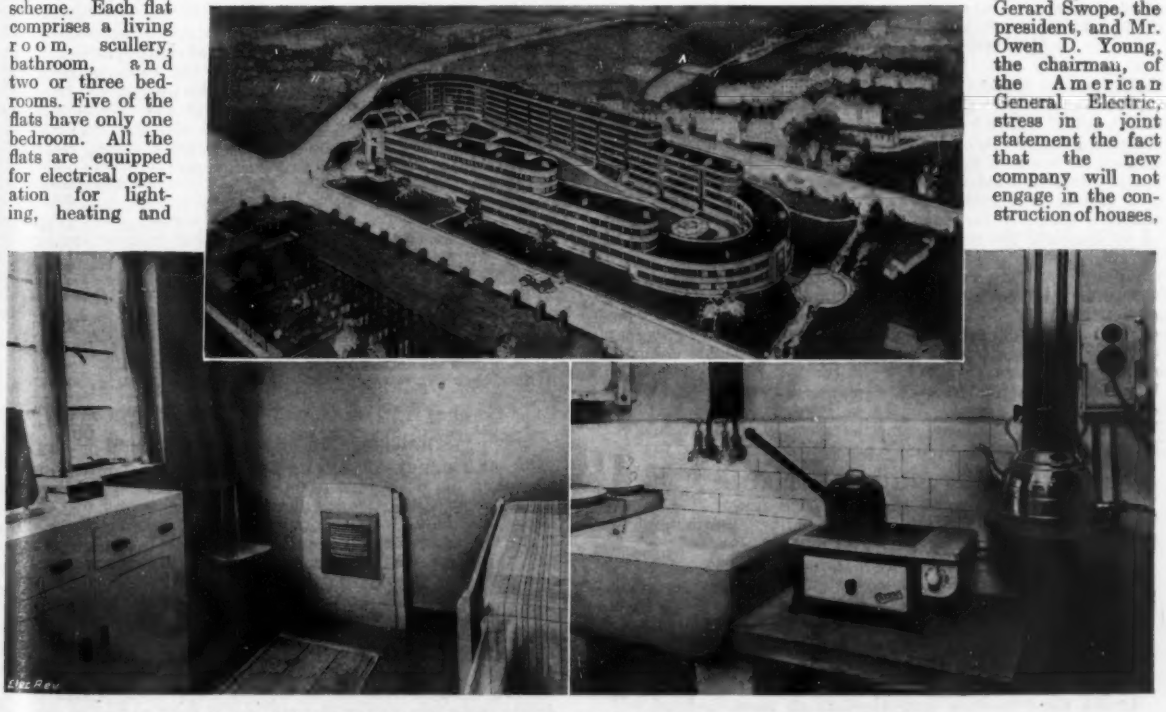
The recently announced decision of the L.N.E.R. to modernise the North Tyneside electrified lines and to electrify the line between Newcastle-on-Tyne and South Shields is followed by the news that a contract for the complete electrical equipment of the rolling stock has been placed with the Associated Manufacturers of Electric Traction Equipment, Ltd., in which company, as already stated here, the following firms are jointly interested: the British Thomson-Houston Co., Ltd.; Crompton Parkinson, Ltd.; Allen West & Co., Ltd.; the English Electric Co., Ltd.; the General Electric Co., Ltd.; and the Metropolitan-Vickers Electrical Co., Ltd. The present contract with the L.N.E.R. will be carried out by Crompton Parkinson, Ltd., as principal sub-contractors in conjunction with Allen West & Co., Ltd., and the British Thomson-Houston Co., Ltd. It covers the supply and installation of sixty-four articulated two-car units equipped with two motors, a number of four-motor vans and coaches, together with the control apparatus and heating and lighting equipment, as well as the re-equipment of a number of existing vehicles.

Electric Welding on the "Queen Mary"

The Glasgow correspondent of the *Financial Times* reports that with a view to reducing the ship's weight so that it may attain greater speed, electric welding is being used on the Cunard-White Star liner *Queen Mary*. Riveted sections are being cut down to be replaced by welded structures, and heavy bulkhead and deck beams are being removed to make way for lighter welded bars.

Residential Flats at Manchester

A new block of flats built by the Manchester Corporation at Smedley Point was opened on July 31st by the Minister of Health, Sir Kingsley Wood. The building, designed by Mr. L. Heywood, Housing Director to the Corporation, is erected round a large internal grass-covered court. The flats are designed in units, each flat containing similar accommodation to that provided in Corporation houses now being built in the city, and, in addition, a self-contained balcony with an area of 33 sq. ft. In addition to the 181 houses, four shops, a community hall and clubroom, and communal washing facilities, have been embodied in the scheme. Each flat comprises a living room, scullery, bathroom, and two or three bedrooms. Five of the flats have only one bedroom. All the flats are equipped for electrical operation for lighting, heating and cooking. There is one coal fire with a combination range for warming, cooking and hot water supply. Electric inset fires are provided in the bedrooms and an electric breakfast cooker and self-contained kettle in the scullery. Electric tubular heating is installed in the public hall and clubroom. The electrical installation and appliances are provided by the Housing Committee without any hire charge. Electricity is supplied on an "all-in" tariff, the fixed charge being collected with the rent and current is supplied through prepayment meter at ½d. per kWh. The estimated all-in cost is expected to average about 1s. 6d. per week each flat. This is the first of several blocks of residential flats to be built in Manchester in the scheme for dealing with the city's slum clearance programme, under which it is expected that 30,000 houses will be condemned. The accompanying views of the flats are reproduced by permission of Mr. Heywood and the particulars were sent to us by Mr. H. C. Lamb, the city electrical engineer.



An artist's impression of the new Manchester flats, and two views of the interior

"All-electric" Flats at Chelsea

The Chelsea Electricity Supply Co., Ltd., through a subsidiary company, is erecting a block of flats in Cheyne Gardens, Chelsea, to be known as Chesil Court. The premises are to be "all-electric." The whole of the domestic hot water supply and central heating is to be dealt with by means of a system of electrode boilers with thermal storage vessels. Electrical apparatus for each flat will be provided by the company without extra charge, and the rents will also include the fixed charge for electricity, the tenant paying a secondary charge of ½d. per kWh for all purposes.

Prize Winning Stands at Olympia

The H.M.V. stand at the Radio Exhibition, Olympia, has been awarded the *Wireless Trader* silver cup. The stand was illuminated by Architectural Lighting, Ltd. The second prize went to Philips Lamps, Ltd., the holders of the cup. In the "limited" class, for which a smaller cup is awarded, the Telephone Manufacturing Co., Ltd., was adjudged the best with Hellesen's, Ltd., as runners-up.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that there will be no "cost-of-living" alteration in wages on the third pay-day in September.

American General Electric Departures

The American General Electric Company recently announced the formation of a company known as Houses, Incorporated, the objects of which are to co-operate with other concerns in the financing and management of houses "of any type which seems worthy and promising." Mr. Gerard Swope, the president, and Mr. Owen D. Young, the chairman, of the American General Electric, stress in a joint statement the fact that the new company will not engage in the construction of houses, its concern being merely with the "interior mechanism" for heating, air conditioning, lighting, cooking and labour saving, which it hopes to develop and standardise.

Closely allied with this venture is a movement initiated by the American G.E. to erect a modern model home for every 100,000 of the American population. One of the features of each of 75 houses on a new estate in Washington, D.C., will be a specially designed G.E. air-conditioning system. This

form of ventilation is making great strides in the United States.

Scottish Electricity Supply Workers' Wages

The Scottish Joint Industrial Council for the Electricity Supply Industry has decided to apply the recent wages award for England and Wales to all grades of workers in the electricity supply industry in Scotland. This will involve an increase of ½d. per hour in the wages of all electricians and semi-skilled and unskilled men employed in the industry. About 3,000 men are affected, and the increase will be paid as from the first pay period after July 18th. It is stated that some undertakings have already put the award into operation.

Business Administration

In 1930 a number of business firms pledged their financial support for a five-year experiment in training University men and women for business careers. At their request and with their co-operation a new Department of Business Administration was established at the London School of Economics in the University of London. At the end of the experimental period the Governors of the London School of Economics have decided, in view of the success which has attended the Department, to make it an integral and more permanent part of the work of the School. In that decision they are supported by the business men associated with the management of the venture. Several of the business firms which contributed towards the cost of the original experiment are continuing

Much interest has been attracted by the latest B.T.H. window display at Crown House, Aldwych, which shows some of the achievements of electrical research

their financial support of the Department, and additional firms are also assisting. The active co-operation of business men in the actual conduct of the work is being continued in all its aspects, by the establishment of a Business Administration Council of business men of widely diverse interests. A number of firms now favour the Department's University scheme as a means of recruiting graduates. By this scheme a firm selects a graduate for appointment and requires him first of all to complete the one-year full-time post-graduate course of training in the Department. The post-graduate course of training, extending over one year of full-time study, remains the principal work of the Department. For the coming session (October, 1935, to June, 1936) a Leverhulme Scholarship of £200 is offered to enable a University man or woman to attend the course, and four bursaries equivalent to complete remission of fees are also offered by the London School of Economics. Particulars of the arrangements for the forthcoming session can be obtained from Professor A. Plant, Department of Business Administration, London School of Economics, Houghton Street, Aldwych, London, W.C.2.

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:—

Premier Electric Co., Hr. Broughton, Salford.
Constable Hart & Co., Ltd., Farnham.
Walter, W. G. (Bath), Ltd., Bath.
Whalley, L. W., & Son, Ashton-under-Lyne.
McAdam, W. Young, Hamilton.
Dove & Partners, Ltd., Darlington.
Wiring, Ltd., London, W.1.
Bellis, R. W., Wallasey.

At the same meeting four applications were declined.

The Electrical Situation in Cyprus and Malta

One of the most interesting features of the report of Mr. J. B. Graves, of the Department of Overseas Trade, on economic conditions in Cyprus and Malta is the increase of imports into Cyprus from the United Kingdom and (in 1934) from other parts of the British Empire. The value of the total imports during 1934 was £1,419,162, as compared with £1,257,256 in 1933. Of this total the United Kingdom's share was £495,923 (against £400,631), and that of other parts of the Empire £151,533 (£98,372).

Analysing the imports, electrical material (other than radio sets and parts) from the United Kingdom increased in value from £1,761 in 1933 to £6,963 in 1934, out of a total for the latter year of £10,186. The increase is probably partly due to purchases of materials for the new telephone system which is being installed in all the chief towns of the island, and which it is hoped will be in operation by the end of the current year. Imports from Germany, the next largest supplier, fell from £2,580 to £1,962. The electricity supply system in Cyprus is 220 V d.c. and a.c., and in Troodos, 110 V.

Imports of United Kingdom goods into Malta during 1934 also showed an increase as compared with the preceding year, the total value being £565,731, as against £528,647. Almost half of the total imports of electrical goods were of British origin (£9,724 out of £19,982), Germany being second with a value of £3,181. The bayonet-type fitting for electric lamps is used in Malta, where the system of supply is 105 V and 210 V, a.c., 100 cycles; the former voltage applies to Valletta and the latter outside.

The report concludes with a note on the trade of Gibraltar, but the only part of this which is of electrical interest relates to radio sets, most of which are of American origin. There is, however, a demand for dry batteries, as in certain areas in Gibraltar an electricity supply is not permitted. Nearly all the batteries sold are of United Kingdom manufacture.

Employment in July

Employment during June in general engineering showed a slight all-round improvement and was moderate on the whole. It was fairly good in electrical engineering and compared with a year ago was better in all sections and in all divisions, except Scotland, where there was no appreciable change. Statistics published in the *Ministry of Labour Gazette* show that the number of unemployed was 115,856, the percentage falling from 12.5 to 12, as compared with the preceding month (13.7 per cent. in July, 1934). In the electrical engineering section the number of unemployed was 5,740, as compared with 6,238, the percentage being 6.3, a decrease of 0.5 per cent. (7.4 per cent. in July, 1934). The number of unemployed in the electric cable, apparatus, and lamp manufacturing group was 10,310, as compared with 11,511, the percentage falling from 8.6 to 7.7. The electric wiring and contracting industry showed a further slight increase, from 5,339 to 5,484, the percentage rising from 16 to 16.4 (16.9 per cent. in July, 1934).

Prizes for Window Displays

In connection with a National Shopping Fortnight in October the "Daily Express" is offering a number of cash prizes and three silver cups for the best shop-window displays in three classes. One of these classes, "Things to Use," will embrace electrical retailers who may find it worth their while to study the particulars of the competition which appear in the advertisment section of this issue.

Irish Free State Electrical Imports

There was a marked improvement in the electrical trade of the Irish Free State during June last, the imports of electrical machinery and cognate material during the month having attained a value of £107,140 as compared with £85,779 in June, 1934. The appended table shows the imports during the first six months of the current and past years:—

	January–June. 1934.	1935.
	£	£
Electric motors	20,692	25,544
Other electrical machinery	99,198	106,487
Dry batteries and parts	10,043	12,876
Electric lamp bulbs	20,235	37,301
Electric lighting accessories, fittings and parts	21,716	40,755
Electric wires and cables, insulated	48,919	48,819
Telegraph and telephone apparatus	6,196	3,015
Radio receivers, complete	21,022	23,838
Radio-gramophones, complete	1,567	1,603
Other radio apparatus, fully or partly assembled	3,636	2,377
Radio parts and accessories	30,136	28,555
Other electrical goods and apparatus	84,545	108,131
Totals	£367,905	£439,301

Municipal Trading at Sunderland

At the monthly meeting of the Sunderland Town Council, Councillor R. S. Robinson put forward a motion to rescind a resolution of the Council that all electric wiring in Council houses be done by the Corporation staff instead of by electrical contractors as previously. Councillor Robinson claimed that the Council's decision would mean the appointment of new officials and would throw electrical contractors out of business. Councillor T. Summerbell (chairman of the Electricity Committee) alleged that local contractors were keeping installation prices up. They had been charging the Council 17s. for lighting points and 19s. for power points, while they were doing other outside work for as little as 12s. Councillor Summerbell claimed that the Electricity Department's staff could do the work much more cheaply, and if they wished to develop the undertaking to its fullest possibilities they would have to do this. Councillor Robinson's motion was lost by thirty-one votes to eighteen.

The Finnish Battery Market

A confidential report on the market for batteries in Finland, based on information furnished by the Commercial Secretary to H.M. Legation at Helsingfors, has been issued by the Department of Overseas Trade. This states that the principal uses to which primary batteries are put in Finland are for electric torches, telephone circuits, radio sets and sig-

nalling systems. Except for the Army no inert batteries are used in Finland and the demand for wet batteries is negligible. Almost the whole of the imports of primary batteries are from Germany and Denmark, who between them supplied goods to the value of 7,171,033 marks in 1934 out of a total of 7,660,254 marks. The imports of accumulators during 1934 had a total value of 6,616,890 marks, the principal sources of supply being Sweden (1,327,205 marks), Germany (2,112,406 marks), Great Britain (1,597,623 marks), and the United States (1,559,269 marks).

A Paris Fair Catalogue Library

With reference to the note which appeared in our last issue we are asked to make it clear that the catalogue library of the Paris International Trade Fair, at 17, Tothill Street, S.W., has been established in order that British concerns may consult particulars regarding French manufactures, and can if they so desire be put into touch with French firms.

Trade Announcements

The Airedale Electrical and Manufacturing Co., Ltd., announces that it has decided to change the name of the new works at Low Moor, Bradford, to which it has recently removed, from "Delta" works to "Macta" works, in order to avoid confusion with other manufacturers using the same name.

Messrs. S. Bill & Co., Ltd., have appointed Messrs. Rowe Bros. & Co., Ltd., of Exeter, as agents for their "Botrade" switch and distribution gear for Devon and Cornwall.

German Radio Exports

The home trade in radio apparatus in Germany continues to expand, but the export branch has declined in recent years The total value of the exports of apparatus for radio-telegraphy and telephony amounted to 78.22 million marks in 1931, but since that year they have declined, the value in 1934 being 26,94 millions, while in the first six months of the current year the value was 13.34 millions.

Orders Recently Booked

The London Passenger Transport Board has placed contracts for fifty-eight two-car units for the Hammersmith and City District Railway section of the Board's undertaking. The orders have been divided equally between the Birmingham Railway Carriage & Wagon Co. and the Gloucester Railway Carriage & Wagon Co.

A Survey of Industrial Development

The Board of Trade has published a "Survey of Industrial Development, 1934" (Stationery Office, 9d. net). This gives particulars of the establishment of new factories, of extensions to existing factories, and of factories closed down during 1934. Establishments not engaged in manufacture or in the processing of new goods have not been included. For the purpose of the survey Great Britain has been divided into eight regional divisions. A section of the report deals with trades showing an increase in the number of factories, in which it is stated that in the electrical engineering industry twenty-two new factories were opened in the following lines of business: Wireless, batteries, &c. (9); domestic appliances (3), and other, including general electrical engineering (10). Eight factories were extended and nineteen closed, twelve of the latter being engaged in the manufacture of wireless, batteries, &c. About 40 per cent. of the electrical industry is in the London region, where sixteen of the new factories, seven extensions, and fifteen of the closed factories were situated. An appendix to the report gives a detailed list of factories opened, extended, and closed in 1934, arranged according to areas.

Berlin Radio Exhibition Fire

A disastrous fire broke out on Monday evening last in one of the halls of the Berlin Radio Exhibition. Although many of the wireless exhibits were destroyed, the valuable television apparatus was saved. The damage is estimated at many thousands of pounds and the cause of the outbreak is at present unknown.

A later message from *Reuter*, Berlin, states that the exhibition was opened again to the public at noon on Tuesday. Herr Hadamovsky, chief of the German Broadcasting Organisation, stated that the exhibition buildings were still standing, and apart from Hall No. 4, which was burnt out, the whole exhibition was undamaged. He added that the exhibition would continue and that by Wednesday morning everything would be in order.

Price of Materials

Messrs. Frederick Smith & Co. report, August 21st: Electrolytic copper bars, £36 10s., 15s. increase; ditto, ditto, wire rods, £41 10s., 5s. increase; ditto, ditto, h.c. wire, 6½d., $\frac{1}{16}$d. increase. Silicum bronze wire, $7\frac{7}{16}$d., $\frac{1}{16}$d. increase.

Messrs. Henry Gardner & Co., Ltd., report, August 21st: No change in the price of copper bars (best selected), sheet and rod. English pig lead, £18, 10s. increase.

Messrs. Edward Till & Co. report, August 21st: No change in the price of India rubber, Para fine.

For Sale

Salford City Electricity Department has d.c. meters for sale.

An electric lighting plant, motors, etc., near Virginia Water, are offered for sale.

(See our classified advertisements.)

The "Villaberry" Fire

In last week's issue (page 216) it was stated that the price of the "Villaberry" fire was less than £3. This is incorrect, the price being £3 8s. 6d.

Dundee Cable Purchases

Once again the Dundee Electricity Committee has decided to purchase £4,000 worth of cable from Belgium and £3,000 worth from Derby Cables, Ltd. The highest British tender was 13½ per cent. higher than the combined offers of Belgian and Dutch firms. Mr. W. Ames, convener of the Electricity Department, said that the Dutch and Belgian offers were £6,187 and the lowest British offer £7,017. They had a guarantee from the Belgian firm that the jute used would be bought from Dundee manufacturers.

New Catalogues and Lists

Holophane, Ltd., Elverton Street, Vincent Square, S.W.1.—A folder on floodlighting during the Silver Jubilee.

Siemens Electric Lamps & Supplies, Ltd., 38-9, Upper Thames Street, E.C.4, has issued a leaflet dealing with new ironclad switch-fuse controlled multi-way splitters.

Alan Wright, Grand Buildings, Trafalgar Square, W.C.2.—The "Tempat" resettable thermal switch is described in a new leaflet.

Ferranti, Ltd., Hollinwood.—Details of miniature electrical instruments.

Newman, Sons & Co., Ltd., Yate, Bristol, have sent us a copy of a new two-colour photogravure publication relating to electrical equipment and power plant.

Blackstone & Co., Ltd., Stamford, have issued a booklet giving particulars of type "E.P.V." totally enclosed vertical Diesel oil engines.

Batwin Electrical Appliances, Ltd., 138, Southwark Street, S.E.1.—A leaflet on the new "Ciglite" and details of an offer of a fan and synchronous clock.

The French Electrical Manufacturing Industry

THE home market of the French electrical industry continues to languish, while it is only with great difficulty that export trade is being maintained. According to the report of the Syndicat Général de la Construction Electrique, the depression which characterised the industry in 1933 became accentuated in 1934 and in the early months of the present year. The market for heavy plant, which showed a decline of 75 per cent. in 1933 in relation to 1930, reached its lowest level in 1934. Had it not been for the exceptional requirements for the electrification of the railways, there would have been a further reduction of 10 per cent. The situation has worsened this year for the orders booked in the first four months show a decline of 36 per cent. as compared with the corresponding period of 1934.

In the case of machines and transformers the reduction in activity last year was 3 per cent. as compared with 1933, and in the first quarter of the current year it was 9 per cent. less than in the corresponding period of 1934. The diminution in electrical apparatus was over 4 per cent. but if a comparison is made with the year 1931 the decline in 1934 amounted to 44 per cent. for machines and transformers, and 33 per cent. for apparatus. Taken as a whole for the entire electrical manufacture the decrease has been 50 per cent. since 1931.

Despite the falling off of the French industry in this respect, the report states that it has been possible to maintain the position in external markets in the past year. The total quantity of electrical material exported amounted to 86,000 cwt. in 1934 as compared with 85,000 cwt. in the previous year, the values having been 108 million fr. and 105 million fr. in the two years respectively. Exports to Poland declined last year by 64 per cent. and those to Spain by 31 per cent. but there was an appreciable increase in the deliveries to Great Britain and Belgium. Exports to the French colonies reached 115,000 cwt. of the value of 133 million fr. as compared with 124,000 cwt. (151 million fr.) in 1933. The maintenance of the external markets has been in most cases effected at prices which were scarcely higher than the costs of production. Despite the difficulties of the present time the report states that the industry has continued to develop technically thus placing it on the same plane as the large foreign competitive industries.

The total imports declined from 168,000 cwt. in 1933 to 148,000 cwt. last year, the values having been 400 million fr. and 350 million fr. respectively, a reduction of 12 per cent. in weight and value. Compared with 1931 the reduction in the imports has been 43 per cent., equal to that which has occurred in the French home market in the same period.

In conclusion the report deals with the problem of the home market and shows the necessity for the conclusion of industrial understandings extending to the largest number of manufactures possible, so as to arrive at a rational organisation of the market.

British Insulated Cables, Ltd., Prescot.—A leaflet on "Rockbestos" a.c.c.a. flexibles.

Henderson's Wholesale Electrical & Radio, Ltd., Electric House, Queen's Road, Brighton.—A complete radio catalogue for 1935-36, now containing lighting pages.

Philips Industrial, 145, Charing Cross Road, W.C.2.—A leaflet drawing attention to a new extension speaker.

Maurice Bobin, 15, Farringdon Avenue, E.C.4.—A leaflet dealing with the "Embob" electric table lamps.

Hart Accumulator Co., Ltd., Stratford, E.15.—A leaflet on cells in glass boxes with sealed lids.

Bankruptcy Proceedings

E. Leighton, 497, Hessle Road, Hull, wireless dealer.—The first meeting of the creditors herein was held on August 14th at the Official Receiver's offices, Parliament Street, Hull. According to the statement of affairs lodged there were liabilities of £587 and assets of £95. The debtor attributed his failure to paying too much for the business, want of capital, and decrease in turnover. The case being a summary one was left in the hands of the Official Receiver, as trustee.

R. W. Hall, 7, Rushton Crescent, Bournemouth, lately Upper Norwich Road, Bournemouth, electrical engineer.—This debtor attended at the Law Courts, Stafford Road, Bournemouth, recently for his public examination. His statement of affairs showed ranking liabilities of £133 with assets of £23, leaving a deficiency of £110. The failure was attributed to excess payments for labour, under-estimating contracts and car expenses. The examination was adjourned for the signing of the notes.

J. Cave and **T. W. Bowler** (Taylor & Wynne), electrical engineers, Back 180, Green Lane, Small Heath, Birmingham (separate application of T. W. Bowler).—Discharge granted subject to bankrupt consenting to judgment for £50. (This sum has been paid to the Official Receiver in lieu of judgment being entered up.)

F. R. A. Lock and **V. C. Lock** (Locke Bros.), electrical engineers, Union Street, Stourbridge. Trustee, Mr. A. M. Fairbairn, 1, Priory Street, Dudley, Official Receiver, released July 18th.

C. W. Everson (Everson's Electrical and Radio Depôt), 93, High Street, Brownhills, near Walsall.—Trustee, Mr. F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham, released July 19th.

A. Whiteley, electrical and mechanical engineer, Tudno Street, Llandudno.—Supplemental dividend of 3s. 7d. in the £, payable August 21st at the Official Receiver's office, St. Peter's Churchyard, The Cross, Chester.

E. C. Wood (Radio Equipment Co.), 15, Brook Street, Chester.—Supplemental dividend of 2½d. in the £, payable August 21st at the Official Receiver's office, St. Peter's Churchyard, The Cross, Chester.

H. Pickup (Electrical & Wireless Stores), electrical engineer, 12, Frank Street, Barnoldswick.—Trustee, Mr. F. H. Langmaid, 71, Manningham Lane, Bradford, Official Receiver, released August 9th.

G. Inman, radio dealer, 121, Overton Road, Sheffield.—First meeting August 28th at the Official Receiver's Offices, Figtree Lane, Sheffield. Public examination October 3rd at the County Court Hall, Sheffield.

G. F. Kennedy (Kennedy & Co.), electrical engineer, Market Square, Shepton Mallet.—First meeting August 28th at 26, Baldwin Street, Bristol. Public examination October 8th at the Guildhall, Wells.

J. Watkins, radio dealer, 25, Bailey Street, Brynmawr.—Last day for receiving proofs for dividend, August 28th. Trustee, Mr. R. Betts, 34, Park Place, Cardiff, Official Receiver.

J. Drake, electrical and wireless contractor, 93, St. Leonard's Road, Windsor.—First and final dividend of 5½d. in the £, payable August 16th at 8, Forbury, Reading.

E. J. Levermore, electrician, Queen's Road, Weybridge.—Receiving order made August 15th on debtor's own petition.

A. Roberts, electrical and radio engineer, 73, Church Street, Gainsborough.—Receiving order made August 15th on debtor's own petition.

Company Liquidations

W. S. Wilton & Co., Ltd., 56, Bromham Road, Bedford, electrical engineers.—The statutory meeting of creditors was held recently at Bedford, when a statement of affairs was submitted showing liabilities of £4,014, all due to unsecured creditors. The net assets were £360, being a deficiency as regarded creditors of £3,654. It was reported that the company was registered in 1928 with a nominal capital of £3,000, fully issued. For the year ended December, 1933, the turnover was £1,965, and there was a net loss of £200; in the following twelve months there was a net loss of £1,970, on sales of £1,635, whilst from December, 1934, to date the net loss was £1,847 on a turnover of £604. The heavy loss sustained during 1934 was attributed to the stock being considerably written down. There were cash claims of £3,600 included in the unsecured liabilities, and one creditor said that provided the company was wound up voluntarily he was prepared to withdraw his claim of £1,500, which was in respect of unpaid salary, and also a claim of £50 due to him for rent. It was resolved that the voluntary liquidation of the company should be continued, with Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., as liquidator, with a committee of inspection consisting of the representatives of the General Electric Co., Ltd., Randalls, Ltd., and Mr. G. Byfield.

Durrants Engineers, Ltd.—Particulars of claims by September 10th to the joint liquidator, Mr. F. E. Bendall, 4, Charterhouse Square, E.C.1.

Express Fan & Motor Co., Ltd.—Meetings September 11th at Balfour House, Finsbury Pavement, E.C., to receive an account of the winding-up by the liquidator, Mr. W. A. J. Osborne.

Emerson Electric Co., Ltd.—Winding up voluntarily. Liquidator, Mr. S. F. Homewood, 4, Old Burlington Street, W. Particulars of claims to the liquidator by September 7th.

Bellphonic Radio & Lighting Co., Ltd.—Winding up voluntarily. Liquidator, Mr. C. Latham, 78, New Oxford Street, W.C.

B.N.B. Wireless, Ltd.—Meetings September 17th at 8, Victoria Street, Liverpool, to receive an account of the winding-up by the liquidators, Messrs. A. Cripwell and J. Airey.

Electricity Supply

Lighting, Domestic, Power

Allhallows (Cumberland).—SUPPLY TO FLETCHERTOWN.—The Parish Council has been notified that the Mid-Cumberland Electricity Co., Ltd., is preparing a scheme for supplying electricity to the village of Fletchertown.

Belgian Congo.—INCREASED ELECTRICITY OUTPUT.—The Société Générale des Forces Hydro-électriques du Katanga (Sogefor), in its report for last year, states that the demand for power from its largest client, the Société de l'Union Minière du Haut Katanga, underwent a marked increase, the quantity taken during the twelve months having amounted to 153,890,000 kWh, as compared with 80,350,000 kWh in 1933. In order to meet the increasing demand the height of the water storage dam was increased, raising the capacity of the storage reservoir from 35 to 75 million cu. metres.

Birtley (Co. Durham).—IMPROVED STREET LIGHTING.—The Parish Council has decided to seek sanction to borrow £2,120 to extend the electric street-lighting system in the village.

Boston.—INQUIRY.—On August 14th Mr. Gordon Tucker held a Ministry of Transport inquiry into the application of the Boston & District Electric Supply Co., Ltd., for wayleaves for an overhead line at Frieston and Gedney. The only objector to the Gedney scheme was a farm owner upon whose land it was sought to erect two poles. In the case of Frieston it was contended that the use of the poles would depreciate the value of land.

Colchester.—CHANGE-OVER.—The City Council is to proceed with a change-over scheme, the cost of which is estimated at £10,468.

EXTENSIONS.—A supply is to be given to Salcot and Virley at a cost of £1,628, to Fordham (£1,645), and to Frinton Garden Village estate.

Czechoslovakia.—HYDRO-ELECTRIC WORKS.—Six large hydro-electric works are being constructed in Czechoslovakia within the scope of the State fund for the utilisation of water power, some having been in progress for the past two years. Nine further schemes are projected.

Dartford.—SUPPLY EXTENSION.—The Electricity Committee is to extend mains at a cost of £215 to supply the Stanham Farm estate now being developed by Messrs. G. H. Giles, Ltd., and Messrs. Norman & Sons.

Denholme.—UNDERGROUND EXTENSION.—The Electrical Distribution of Yorkshire, Ltd., has informed the Urban District Council of its intention to extend its supply from Lower Whiteshaw Farm to the Fieldhead estate, by means of underground cables.

Dorby.—ANNUAL FINANCIAL RESULTS.—The profit on the electricity undertaking for the last financial year was £35,695, as compared with £44,466 last year, the revenue from all sources showing an increase on the year of £13,027, while total expenses, including working costs and capital charges, were £21,798 higher. The amount of electricity sold during the year increased by 14.6 per cent. over last year. There was an increase in rates of nearly £10,000, and the fact that this sum was being paid is held to be sufficient justification for not giving anything to the relief of the rates this year; £6,000 was allocated last year. New boiler plant is to be installed.

East Preston.—NEW WIRING.—West Sussex County Council is to renew the whole of the wiring at the East Preston Institution.

Enfield.—The North Metropolitan Electric Power Supply Co., is to lay an underground 11,000-V cable at Brimsdown instead of erecting an overhead line as originally proposed.

SUPPLY TO ESTATE.—The Urban District Council has arranged terms for a supply of electricity to the Albany estate. The North Metropolitan Electric Power Supply Co., canvassed the tenants, and 250 agreed to the installation of electricity.

France.—ALSACE-LORRAINE.—The report of the Groupement des Producteurs et Distributeurs d'Energie Electrique d'Alsace et de Lorraine for last year states that the power output in the two provinces has been markedly influenced by the completion of the Kembs hydro-electric scheme. The group comprises thirty-six affiliated undertakings with a total installed capacity of 344,000 kW, about two-thirds of which is steam plant. Last year the total output amounted to 553 million kWh, as against 406 million in 1933. In addition, about 440 milion kWh was imported. It is estimated that, based on the 1931 census, the average annual consumption of electricity per inhabitant of the two provinces now amounts to 350 kWh, as compared with an estimate of 305 kWh per head of population in the whole of France.

Gateshead.—ELECTRIFICATION PLAN.—The question of installing electricity in 244 houses at present served by gas is being considered by the Town Council. The North-Eastern Electric Supply Co., Ltd., has agreed to lay mains free of charge provided the Council will allow it to erect overhead lines between each house.

George Town (Penang).—ANNUAL REPORT.—Three departures from usual procedure are mentioned in the 1934 report of Mr. T. Rogers, municipal electrical engineer and tramways manager. First, the Hiring Department undertook the hiring out of electrical refrigerators, fifty-six being installed during

the eight months to the end of the year. Secondly, street lighting by means of "Osira" electric-discharge lamps suspended from ornamental steel poles was tried along the first section of a new beach road. Mr. Rogers states that the lighting proved very satisfactory and would probably be extended to other parts of the town. The third innovation was the erection of a 11 kV lead-covered cable supported as a catenary on the present l.v. distribution poles between Tanjong, Tokong, and a sub-station at Sungei Klean. If satisfactory this method will enable further extensions to be dealt with in parts of the outlying areas in a somewhat more economical manner. With regard to supply results, the Department sold 12,153,000 kWh as compared with 10,526,000 in 1933, there being an increase in practically every direction. The total revenue was $1,116,551 (against $1,047,747) and expenditure, including loan charges, &c., $1,102,058 ($1,058,202), the net profit being $105,043 ($79,016).

Glasgow.—ALL-ELECTRIC HOSPITAL.—The scheme for Scotland's first all-electric hospital at Cowglen has been unanimously approved by the Health Committee. It is estimated that the cost of an electrical installation for heating, lighting, cooking and other services, will be £34,000, as against £61,000 for a coal installation. The annual cost for energy and capital charges will be £7,350 a year, as against £8,405 for coal. It is also believed that the annual charges for a coal plant would exceed those for electrical equipment. The Clyde Valley Electrical Power Company is to provide the supply under a five-year contract. The hospital is estimated to cost more than £300,000, and will accommodate 300 patients suffering from infectious diseases. It is to be completed within two years.

Huntly (Aberdeenshire).—STREET LIGHTING AGREEMENT.—The terms of the agreement for the public street lighting of the burgh for fifteen years have been approved by the Town Council and the Grampian Electricity Supply Co. The town clerk has stated that every effort will be made to ensure full street lighting not later than September 15th next.

Ipswich.—RAPID DEVELOPMENT.—An increase of 9.7 per cent. in the amount of electricity sold is shown in the report of the chief electrical engineer and manager, Mr. H. E. Blackiston, for the year ended March 31st last, in spite of a loss of over two million kWh through the cessation of a temporary bulk supply to the Central Electricity Board, and a drop of nearly five million kWh due to the loss of the bulk supply to the East Anglian Electric Supply Co., Ltd. Actually the increase in the Corporation's own area of supply was 22.06 per cent., there being a 13 per cent. increase in the number of consumers.

Largs (Ayrshire).—ILLUMINATIONS.—The municipal illuminations this year will be from September 13th to 30th.

Manchester.—NEW POWER STATION.—The Electricity Department has been advised by the Central Electricity Board to seek a site for a new generating station, probably near the Manchester Ship Canal.

Mansfield.—HIRE-PURCHASE SCHEME.—The Electricity Committee has had a report regarding hire-purchase, and has agreed that in approved cases electrical appliances to the value of £2 and upwards shall be let out on hire-purchase terms.

Oldham.—CONCESSIONS.—The Electricity Committee has decided to make the following concessions:—New lighting flat rate discount: 1,000 kWh per quarter, 2½ per cent.; 2,000 kWh, 5 per cent.; 4,000 kWh, 7½ per cent.; 8,000 kWh, 10 per cent., and 12,000 kWh, 20 per cent. The committee has also decided to make a refund of ½d. per kWh in respect of the flat rate (prepayment meter) and the assisted wiring (prepayment meter) schemes. Under the prepayment meter system lamps are to be renewed free of charge when deemed necessary, in the proportion of one lamp for each 50 kWh consumed.

Reading.—EXTENSIONS.—The Town Council is to carry out mains extensions in the borough at an estimated cost of £1,217.

Renfrew.—ELECTRICAL INSTALLATIONS.—The Strathclyde Electrical Supply Co., Ltd., has received applications from over seventy tenants of the Corporation houses in Victory Gardens who desire to wire and fit their houses for electricity at their own expense under the Strathclyde Co.'s hire-purchase arrangement, and the Housing Committee recommends the Town Council to grant permission.

Riccarton (Roxburghshire).—RAILWAY JUNCTION LIGHTING.—The L.N.E. Railway Company has decided to install plant at Riccarton Junction for the electric lighting of the yard and the station premises. Oil lamps are at present in use. The new plant will consist of two 5½-kW Diesel-electric generating sets with a maximum running speed of 1,250 r.p.m., and generating electricity at 250 V.

Salford.—ANNUAL REPORT.—Although the statistics in the annual report of Mr. L. Romero, the chief electrical engineer and manager, show an increase in the sales of 5 per cent. over the previous year, the figure is misleading for comparative purposes because the amount of electricity sold during 1933-34 was made artificially high by an alteration in the meter reading dates; when allowance has been made for this factor the increase is 8 per cent. The exceptionally mild winter also had an adverse effect upon consumption. The number of consumers increased by 6,373 to 34,272, the net additional load connected at March 31st last being 14,485 kW. A list of motors used in the various trades is included in the report, the four trades using the greatest h.p. being engineering trades, 8,738 h.p.; docks, 7,869; cotton bleaching, dyeing and finishing, 6,593; and woodworking, 5,070.

Seaham Harbour.—LOANS.—The Electricity Committee is seeking sanction to borrow £1,000 for meters and £1,000 for mains.

Sheffield.—MORE ELECTRICITY USED.—During the twelve months to March 31st, 1935, 10,365 new consumers were connected to the mains. Although this is an increase of only 8.3 per cent., the actual quantity of electricity used rose by 23 per cent.

South Africa.—SPRINGS.—The Town Council proposes to spend £16,500 on extensions to the electricity supply plant, and £12,000 on the lighting of main trunk roads.

JOHANNESBURG.—The City Council has applied to the Provincial Administrator for permission to borrow £430,000 for a further 20,000 kW extensions to the Jeppe Street power station.

LADYSMITH.—The municipal council has approved a loan of £4,500 for an electric lighting scheme.

South Shields.—ILLUMINATIONS.—Over 200 special lighting devices in 30 different designs have been devised by Mr. J. Edgar, the borough electrical engineer, for the town's illuminations during the fortnight commencing September 2nd. They will be on a much bigger scale than last year.

Spenborough (Yorks).—LOAN.—The Urban District Council has received sanction to a loan of £1,820 for the improvement of the electricity supply in the Oakenshaw district.

Stirlingshire.—ELECTRICITY FOR SCHOOLS.—The County Council has agreed that all schools in the county shall be wired for electricity, at an estimated cost of £6,693.

Torquay.—PROPOSED PURCHASE.—The Corporation of Torquay intends to apply to the Electricity Commissioners for a Special Order enabling it to purchase from the Teignmouth Electric Lighting Co. the undertaking authorised by the Teignmouth 1926 Order, states the *Financial Times*.

SUPPLY EXTENSIONS.—The Electricity Committee has prepared a scheme for supplying Haccombe and Stoke-in-Teignhead, the cost of which is estimated at £3,750, and it has now obtained sanction to provide supply to Maidencombe.

LOAN.—Sanction is being sought by the Electricity Committee to a loan of £25,000 for mains and services.

Trimdon (Co. Durham).—STREET LIGHTING.—The Parish Council has terminated its agreement with the local colliery company for supplying electricity for street lighting and proposes in future taking its supply from the North-Eastern Electric Supply Co., Ltd.

Turriff (Aberdeenshire).—The Town Council has decided by a majority of one vote to accept a tender by the Grampian Electricity Supply Co. to light the burgh by electricity in preference to a tender by the Turriff Gas Co, which at present carries out the lighting.

Wakefield.—STREET LIGHTING CONVERSION.—The Lighting Committee recommends the conversion of street lighting in Denby Dale Road from gas to electricity.

Wallsend.—CABLE-LAYING.—The Town Council has approved plans submitted by the North-Eastern Electric Supply Co., Ltd., for the laying of low-voltage cables in Station Road and the parallel road on the west side.

Walton and Weybridge.—MAINS EXTENSIONS.—Mains are to be extended by the Urban District Council to houses in Red House Lane, Walton Road, Walton Grove, Rydens Avenue, Molesey Close, and a new road off New Zealand Avenue.

Warwickshire.—GAS REPLACED BY ELECTRICITY.—Having had complaints from the justices of the Kenilworth petty sessional court regarding the inadequacy of the existing gas lighting at the Milverton Police Court, the Standing Joint Committee has decided to install electricity.

West Midlands.—J.E.A. REPORT.—In the year ended March 31st last the four power stations of the West Midlands Joint Electricity Authority generated 368,992,000 kWh as compared with 310,796,000 kWh in 1933-34 (Ironbridge, 258,086,000 kWh against 123,904,000 kWh). No addition was made during the year to the plant capacity (131,500 kW), the maximum load being 112,110 kW. It is estimated, however, that the maximum load next winter will reach 163,000 kW, and work was put in hand on a 50,000-kW extension at the Ironbridge station. It was also decided to repair the 10,000-kW turbo-generator installed in 1928 at the Ocker Hill station, which had broken down. Considerable progress was made during the year with the electrification of the Authority's rural distribution area in Shropshire, the number of consumers at the end of March last being 3,808 as compared with 2,324 a year before. The length of mains in the area was increased from 160 to 237 miles. The annual statement of accounts shows that the total revenue from the distribution area was £40,715 and expenditure £41,385, leaving a net deficiency of £670. On the bulk supply account a surplus (partly estimated) of £38,687 is recorded.

Wigton.—OVERHEAD LINES.—The Rural District Council has decided not to object to the erection of overhead lines at West Thursby and West Curthwaite by the Mid-Cumberland Electricity Co., Ltd.

Williton.—OVERHEAD LINE.—The Rural District Council has consented to an application by the Minehead Electric Supply Co. to erect an overhead cable to supply the parish of Timberscombe by an extension from Wootton Courtenay.

Wolverhampton.—EXTENSIONS OF SUPPLY.—At a cost of £7,300 for cables and £3,639 for switchgear, the Electricity Committee proposes to carry out work in connection with the supply to Messrs. Courtaulds & Goodyear.

Worthing.—OPPOSITION TO PYLONS.—In view of the opposition of the Town Council to the erection of a new transmission line across the South Downs near Cissbury Ring, the Central Electricity Board has agreed to reconsider its proposals.

Traction

Bombay.—SUBURBAN RAILWAY ELECTRIFICATION.—Another sixteen miles of suburban railway at Bombay is to be electrified at a cost of nearly £200,000. It is expected that the scheme will be completed next June.

George Town (Penang).—BETTER RESULTS.—As Mr. T. Rogers, the municipal electrical engineer and tramways manager, anticipated in his 1933 report, better conditions prevailed during last year. Not only did the number of passengers increase by 1,327,561 (17 per cent.), but working costs fell from $192,428 to $186,186. Thus, despite cheaper fares having been introduced, a loss of $12,492 was changed into a profit of $7,881. This satisfactory result is no doubt due in some respect to the introduction of by-laws controlling the activities of competitors, who, not obliged to run to schedule, had hitherto waited at the regular stops until the municipal vehicles arrived and then moved off with every available passenger.

Glasgow.—ESTIMATES APPROVED.—The Transport Committee has approved the following estimates for the year: £35,000 for subway section electrification; £45,000 for power- and substation plant; £3,000 for electrical line equipment; and £73,000 for cars.

Ipswich.—ANNUAL REPORT.—Even allowing £1,770 for extra traffic due to the Royal Agricultural Show, there was still an increase of £6,083 in the income of the Transport Department during 1934-35 as compared with the previous year. The journeys per head improved from 149.6 to 161.5, and the bus mileage by 6.53 per cent. from 1,544,213 to 1,645,056. The total income was £82,934, working expenses £63,862 (as compared with £58,093 for the previous year), and the net profit £2,036, made up of a surplus of £5,261 on the buses and a deficit of £3,225 on the tramways.

Italy.—ELECTRIFICATION PROGRESS.—New works now being put in hand by the Italian State Railways include the conversion from three-phase to 3,000 V d.c. of the old mountain line between Florence and Bologna *via* Pistoia. It is being fed by two rectifier sub-stations provided with inverted operation to permit regeneration. The Rome-Sulmona line, now three-phase 45 cycles, is also being converted to d.c. The electrification on the h.v. d.c. system of the Florence-Rome main line is almost complete, and the electric service will begin next month.

Liverpool.—REPORT ON THE TRAMWAY UNDERTAKING.—During the year ended March 31st last, states Mr. W. G. Marks, the general manager, there was an increase of 5,308,698 in the number of passengers carried by the Corporation tramways, bringing the total to 243,949,677, while the mileage rose by 461,265 to 19,649,175. The total revenue for the year was £1,337,163 (previous year £1,304,871), the working expenses £1,084,412 (£1,067,224), and the net surplus £170,255 (£155,438). The operating costs per car mile were reduced from 13.03d. to 12.94d., while the average fare per passenger rose from 1.272d. to 1.275d. The City Council has decided that the tramways shall be retained in the passenger transport undertaking as the chief method of passenger transport for the present, and that in future any surplus on the transport accounts, instead of being allocated to the relief of the city rates, shall be placed to a fund set aside for the purpose of facilitating the possible subsequent alteration of the methods of passenger transport to any other form which may be desirable. Meanwhile, 300 new cars are being built and 162 are to be modernised.

Manchester.—ANNUAL REPORT.—During the year ended March 31st last, according to the report of Mr. R. Stuart Pilcher, general manager of the transport undertaking, there was a further fall in tramway revenue, the total receipts being £1,313,288 as compared with £1,421,545 for the previous year. This was partly due to the conversion of 32 miles of route to bus operation, but there was also a decline of £38,498 on unconverted routes. The number of passengers carried decreased by 7.3 per cent. to 216,019,572. Working expenses fell only slightly to £1,045,036 (£1,099,560), with the result that the net profit of £65,990 was £33,185 lower than in the previous year. In the following statistical information the figures given in brackets are those for 1933-34. Car miles run, 18,924,296 (20,026,744); average fare, 1.44d. (1.45d.); average number of passengers per car-mile, 11.41 (11.63); traffic revenue per car-mile, 16.431d. (16.882d.); working expenses per car-mile, 13.253d. (13.177d.)

Southport.—TRANSPORT UNDERTAKING'S RESULTS.—The year 1934-35 saw the completion of the programme of substituting motor buses for trams, states Mr. T. J. Kendrew, the engineer and manager in his last annual report. In view of this fact it is difficult to make any comparison with the previous year. Nearly five million passengers were carried and there was, at the end of the year, a net profit of £3,737 (£5,615 in 1934) although the total revenue fell from £33,427 to £24,315.

Communications

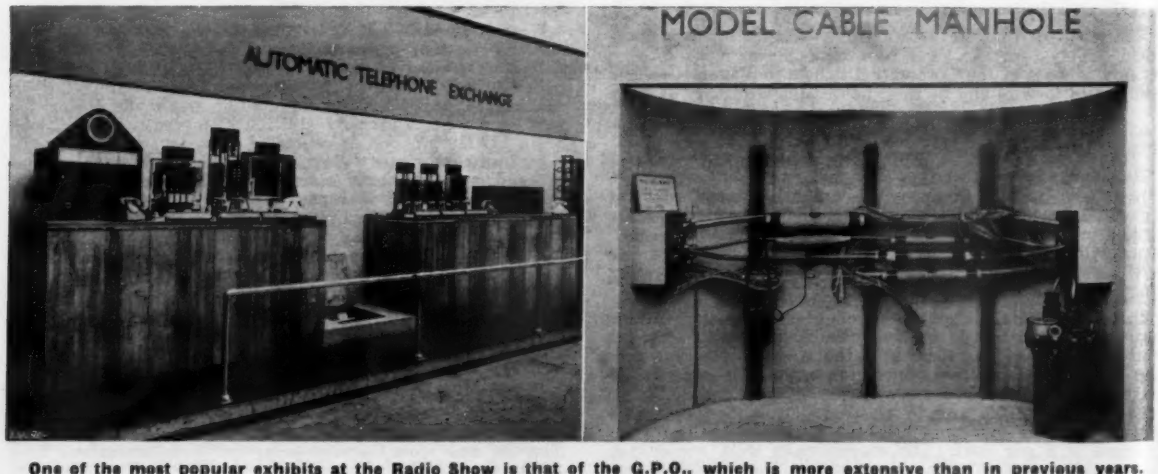
Belgium.—COMMUNICATION WITH SHIPS.—L'Agence Maritime Internationale, Antwerp, has recently authorised the establishment of a radio-telegraphic and telephonic transmitting and receiving station in the River Scheldt docks to enable communication to be made with ocean passengers before the arrival of the ships.

Great Britain.—ULTRA-SHORT WAVE EXPERIMENTS.—Five amateur experimenters, members of the International Short-Wave Club, took part in a test on the roof of *The Daily Telegraph* building in Fleet Street on Sunday. Their apparatus consisted of a home-made transmitter, which cost 7s., apart from batteries, and a home-made receiver costing 12s. 6d. (without batteries), stationed at Regis House, King William Street, E.C. Using a wavelength of half a metre they were able to transmit signals which were picked up with reasonable clarity at a distance of a mile and a quarter. The path of the "beam" was interrupted by Cannon Street Station, but, although its metal construction affected the quality of the reception, the signals could be quite easily taken at Regis House. Dr. C. G. Lemon, one of the experimenters, said that the beam thrown by the set was about five or six yards wide at a distance of a mile.

Greece.—RADIO CONTRACT.—It is reported from Athens that the Government has now broken off the negotiations with an English and a German company regarding the construction of broadcasting stations and is inviting tenders for the work. The stations will be operated by the State, which will defray the costs of construction.

India.—BROADCASTING IN HYDERABAD.— It is understood that the Government of the Nizam of Hyderabad has decided to place an order with the Marconi Co. for the supply of two broadcasting stations of 3.5 kW and 500 W rating.

Turkey.—PURCHASE OF ISTANBUL UNDERTAKING.—According to a *Reuter* message from Istanbul, the Turkish Government has reached an agreement with the Istanbul (Constantinople) Telephone Co. for the purchase of its undertaking at a cost of £800,000, payments to be spread over a period of years, and will shortly take over the system.



One of the most popular exhibits at the Radio Show is that of the G.P.O., which is more extensive than in previous years. Our illustration shows two of the telephone demonstrations

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—BUENOS AIRES.—September 24th. National Sanitation Works Department. Electric generating sets and pumping sets. (T.Y. 10030.)*

Australia.—MELBOURNE.—October 7th. State Electricity Commission of Victoria. Paper and varnished cambric insulated, l.c. wire armoured cables. (T.10047.)*

Ayr.—September 2nd. County Council. Electric lighting at reconstruction of Beith Constabulary station. W. Reid, County architect, County Buildings.

Banff.—August 26th. Chalmers Hospital Committee. Various works, including electrical and heating, at nurses' home. G. Bennett Mitchell & Son, 1, West Craibstone Street, Bon Accord Square.

Beckenham.—August 26th. U.D.C. Steel lamp columns. (August 9th.)

Birmingham.—Baths Committee. New Public baths, Kingstanding: Electric lighting, heating and power installation. New Public baths, Northfield: Electric lighting and heating installation and hot water boilers with automatic stokers. St. George's Street Cottage baths, Hockley: Hot water boilers fitted with automatic stokers. Specifications from the Superintendent engineer, Baths Department, Kent Street (deposit £2 2s. for each specification) by August 28th.

Dunfermline.—August 26th. Town Council. Various works, including electrical, at new maternity hospital. C. R. Douglas & Son, Prudential Chambers, East Port (deposit £1 1s.).

Eastbourne.—September 9th. Electricity Department. Tower wagon petrol-driven vehicle. (See this issue.)

Edinburgh.—August 24th. City Council. Vehicle-actuated traffic signals. (August 9th.)

Farnworth.—September 12th. Electricity Department. Wiring cables, cookers, cooker control units, wash-boilers, and l.p. cables. (See this issue.)

Glasgow.—August 26th. Corporation. Electric lighting installations at Fulton Street and Montrave Street housing schemes. General Manager, Electricity Department, 75, Waterloo Street.

Heston & Isleworth.—September 2nd. Electricity Department, transformer, on-load tap changing equipment, 11,000-V truck type cubicle and l.p. feeder panels. (August 16th.)

India.—MALAKAND.—September 20th. India Store Department. Hydro-electric plant. (See this issue.)

Leeds.—August 30th. Works and Supplies Department. Electrical installations at the St. James' Hospital. F. Broadbent, architect and executive officer, Civic Hall.

Liverpool.—September 13th. Corporation. Equipment for fifty double-deck tramcars. (See this issue.)

London.—FULHAM.—September 16th. Circuit-breakers and 6,600-V and 400-V cable. (August 16th.)

Manchester.—September 6th. Exhauster, &c., for boiler and boiler-house vacuum cleaning plant, and 6.6-kV switchgear. (See this issue.)

Middlesbrough.—September 16th. Electricity Department. Static transformer. Borough electrical engineer, Snowdon Road.

Oswestry.—August 31st. Electricity Department. E.h.p. truck-type cubicle and a complete e.h.p. transmission line. (August 16th.)

Plymouth.—September 7th. Corporation. L.p. distribution boards. (August 16th.)

Portsmouth.—August 29th. Town Council. Conversion of tramway overhead line for the operation of trolleybuses, construction of new trolleybus lines and supply of brackets and fittings for supporting street lamps from the poles. Contracts and Supplies Section, City Treasurer's Department, Guildhall.

Portsmouth.—August 29th. Transport Committee. Seventy-six trolley vehicles. Particulars from the transport manager.

St. Andrews.—August 27th. Town Council. Electrical work in connection with alterations at Kinburn House. Walker & Pride, chartered architects, Church Square (deposit £1 1s.).

Seaham Harbour.—U.D.C. 800 yd. of cable and 1,200 yd. of copper strand pole line material. Electrical engineer, Blandford Place.

South Africa.—CAPETOWN.—September 25th. Electricity Department. Thirty outdoor type transformers and twelve sets of automatic equipment. (T.Y. 10049.)*

Southampton.—August 27th. Electricity Department. Transformers, switchgear and cable. (August 16th.)

August 26th. Electric lighting and heating installations at the Audit House, High Street. W. G. Turner, borough electrical engineer, Civic Centre (deposit £1 1s.).

Stoke-on-Trent.—September 11th. Electrical Engineer's Department. Cookers. (See this issue.)

Swansea.—September 2nd. County Council. Wiring for electric lighting, heating, power and signalling systems in the access galleries to storage tanks and in the screening house at Mumbles. Office of the Chief Engineer, J. Richard Heath, Guildhall (deposit £2).

September 2nd. Electricity Department. Chemical apparatus, chemicals and reagents. (See this issue.)

Warrington.—September 2nd. Electricity and Tramways Committee. E.h.p. sub-station switchgear. (August 9th.)

West Ham.—Public Assistance Committee. Electrical installation in the proposed Nurses' Home and maids' quarters at the Whipps Cross Hospital, Leytonstone. (See this issue.)

Wolverhampton.—August 30th. West Midlands Joint Electricity Authority. 33,000-V cable. (August 9th.)

Worsley.—September 7th. U.D.C. Electric lighting, heating, ventilating, hot and cold water installation, filtration plant and laundry equipment for swimming baths, &c., Bridgewater Road, Walkden. Ormrod, Pomeroy & Foy, architects, 21, Acresfield, Bolton (deposit £3 3s. to the Council's collector, Town Hall, Walkden, cheques to be made payable to the Worsley U.D.C.).

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Aberdeen.—Housing Committeee. Accepted. Electric lighting at the Hilton Drive housing scheme (£198).—J. B. Reid.

Darlington.—Town Council. Accepted. Sub-station equipment.—British Thomson-Houston Co., Ltd.

Dover.—CORRECTION.—In our last issue we stated that the Town Council had accepted a tender for motors from "Briggs Motors, Ltd." This should, of course, have been Higgs Motors, Ltd., and we regret the error.

Gateshead.—Town Council. Accepted. Electric lighting in 318 houses in Askew Road and the Saltmeadows estate (£1,110).—J. Newton.

Glasgow.—Transport Committee. Accepted. Copper trolley wire.—W. F. Dennis & Co. Weatherproof lanterns.—Wardle Engineering Co., Ltd. Electric hoist block for general stores.—North British Lifting & Moving Appliances Co., Ltd. Transformers for Coplawhill sub-station.—English Electric Co., Ltd. Switches for section boxes.—British Insulated Cables, Ltd.

Housing Committee. Accepted. Electrical installations at Hillington Park (£491) and South Balornock (£2,283) housing schemes.—J. Stuart Denholm.

Government Contracts.—The following contracts were placed by various Government Departments during July:—

ADMIRALTY.

Dry batteries.—Siemens Bros.

Junction boxes.—Engg. & Lightg. Equipment Co.

Branch breakers, &c.—Whipp & Bourne.

Cable.—Anchor Cable Co.; B.I. Cables; Craigpark Electric Cable Co.; Ediswan; Enfield Cable Works; G.E.C.; W. T. Glover & Co.; Hackbridge Cable Co.; Henley's; Hooper's Telegraph & I.R. Works; I.R.G.P. Co.; Johnson & Phillips; Liverpool Electric Cable Co.; Metropolitan Electric Cable & Const. Co.; St. Helens Cable & Rubber Co.; Ward & Goldstone; Telegraph Const. & Maintenance Co.; Siemens Bros.; Standard Telephones.

Electric cranes.—Wharton Crane & Hoist Co.; Sir Wm. Arrol & Co. Sub-contractors: Laurence, Scott & Electromotors for motors; Allen West & Co. and E.M.B. Co. for control gear.

Engine room fan units.—Veritys; W. H. Allen, Sons & Co.; Mawdsleys. Sub-contractors: Thermotank and Matthews & Yates for fans, Allen West & Co. and E. N. Bray for control gear.

Electric lamps.—G.E.C.; Siemens Electric Lamps & Supplies; B.T.H.

Motors and motor alternators.—Electro Dynamic Construction Co.

Electrically driven pumps.—Pulsometer Engg. Co. Sub-contractors for motors: Mawdsleys; E. N. Bray.

Ring main breakers, fuse release switches.—Bertram Thomas; Whipp & Bourne.

Automatic telephone gear.—Siemens Bros.

W.t. valves.—Mullard Radio Valve Co. Sub-contractors: Thermal Syndicate.

Welding resistances.—Allen West & Co.

WAR OFFICE.

Cable laying apparatus.—Siemens Bros.; J. M. Dangerfield & Sons.

Arc centralisers.—Chance Bros.

Electric cable.—G.E.C.; Johnson & Phillips; Hackbridge Cable Co.; Enfield Cable Works.

Electric lighting fittings.—B. W. Johnson.

Generating sets.—R. A. Lister & Co.

AIR MINISTRY.

Accumulators.—Batteries, Ltd.

Inert batteries.—Siemens Bros.

Engine-driven generator accessories.—D. H. Bonnella & Son.

Radio beacon equipment and w.t. receivers.—Plessey Co.

Torque reaction dynamometer.—Laurence, Scott & Electromotors.

Wavemeters and artificial aerials.—Gambrell, Rowse & Snoaden.

POST OFFICE.

Telegraphic apparatus.—Creed & Co.; Power Equipment Co.

Telephonic apparatus.—Automatic Electric Co.; Ericsson Telephones; G.E.C.; Phœnix Telephone & Elect. Works; Siemens Bros.; Standard Telephones; Telephone Manufacturing Co.

Testing and protective apparatus.—Ernest Turner Electrical Instruments; W. Jones & Co.; Phœnix Telephone and Electric Works; Power Equipment Co.

Electric cable.—B.I. Cables; Connollys (Blackley); G.E.C.; Hackbridge Cable Co.; Henley's; London Elect. Wire Co. & Smiths; Pirelli-General Cable Works; Siemens Bros.; Standard Telephones; United Telephone Cables.

Loading coils.—G.E.C.; Siemens Bros.

Telephone cords.—London Elec. Wire Co. & Smiths; L.P.S. Electrical Co.; Phœnix Telephone & Elect. Works; Reliance Elecl. Wire Co.; Siemens Bros.; Standard Telephones.

Insulators.—Litholite Insulators & St. Albans Mouldings; Taylor, Tunnicliffe & Co.

Protecting and armouring cable.—Hackbridge Cable Co.

Electric trucks.—Greenwood & Batley.

Wire.—Dorman Long & Co.; Richard Johnson & Nephew; Shropshire Iron Co.; Whitecross Co.; Whitehead, Hill & Co.; G.E.C.; London Elec. Wire Co. & Smiths; Reliance Electrical Wire Co.

Cabling.—Grantham-Grimsby; Junction Wragby-Louth; Bradford-Huddersfield; Carmarthen-Junction Ammanford.—United Telephone Cables. Luton-Dunstable.—Siemens Bros.

Cabling and loading coils.—Aberdeen-Aboyne.—Standard Telephones. Doncaster-Scunthorpe.—United Telephone Cables. Sub-contractors for Doncaster: Automatic Electric Co. for loading coils. St. Albans-Luton-Junction Bedford.—Siemens Bros. Wareham-Swanage.—Pirelli-General Cable Works. Sub-contractors for Wareham: Salford Electrical Instruments for loading coils.

Electric lift.—Paddington District Office: Evans Lifts.

Telephone exchange equipment.—Rusholme (Manchester); Bromsgrove; Arnold (Nottingham); Roundhay, Headingly and Chapeltown (Leeds).—Automatic Electric Co. East (Manchester); Riverside & Hampstead (London); Peterborough; South Wootton (King's Lynn); Derby.—Ericsson Telephones. Sub-contractors for East and Riverside: Chloride Elecl. Storage Co. for batteries; Electric Construction Co. for motor-generators and ringing machines. Sub-contractors for Derby: D.P. Battery Co. for batteries; Electric Construction Co. for motor generators and ringing machines. Gerrard (London); Gatley (Manchester).—G.E.C. Westcotes (Leicester); Wakefield.—Siemens Bros. Swanage; Halifax; London Trunk Exchange; Shanklin; Wednesbury (Birmingham); Cambridge.—Standard Telephones.

Telephonic repeater equipment.—Beattock; Lancaster; Carlisle.—Austinlite. Sub-contractors for Beattock: Victor Oil Engine Co. for oil engines; Electric Construction Co. for motor generators. Sub-contractors for Lancaster and Carlisle: Victor Oil Engine Co. for oil engines; Electric Construction Co. for motor generators; W. Jones & Co. for ringing machines. Carlisle; Oxford.—Standard Telephones.

Voice-frequency telegraph equipment.—Belfast.—Standard Telephones.

CROWN AGENTS FOR THE COLONIES.

Battery jars.—Tudor Accumulator Co.
Cables, &c.—Standard Telephones.
Cut-outs.—Henley's.
Electric cranes.—Babcock & Wilcox.
Submarine telephone cable.—Siemens Bros.
Telephone exchange apparatus.—G.E.C.

Hastings.—Entertainments Committee. Accepted. Emergency lighting battery for White Rock Pavilion.—Britannia Batteries, Ltd.

Electricity Committee. Accepted. Electric goods lift at Earl Street stores (£257).—Evans Lifts, Ltd.

Hereford.—Education Committee. Accepted. Electrical installations at schools: Lord Scudamore's (£374).—C. F. G. Roberts. Saint Owen's (£130).—W. Rowberry & Son. Saint Peter's (£111).—Harding Bros., Ltd.

Maidens & Coombe.—U.D.C. Accepted. Electric street lighting (£1,498).—General Electric Co., Ltd.

Margate.—Town Council. Accepted. Electrical pumping plant at the Wingham waterworks (£7,104).—Sulzer Bros. (London), Ltd.

Reigate.—Corporation. L.p. cables for six months:—

	£
Derby Cables, Ltd. (accepted)	1,905
Callender's Cable & Construction Co., Ltd.	2,485
Johnson & Phillips, Ltd.	2,551
Macintosh Cable Co., Ltd.	2,556
Standard Telephones & Cables, Ltd.	2,565
Union Cable Co., Ltd.	2,597
Siemens Bros. & Co., Ltd.	2,602
W. T. Henley's Telegraph Works Co., Ltd.	2,613
Connolly's (Blackley), Ltd.	2,614
Hackbridge Cable Co., Ltd.	2,615
Metropolitan Electric Cable & Construction Co., Ltd.	2,622
Pirelli-General Cable Works, Ltd.	2,622
British Insulated Cables, Ltd.	2,633
Telegraph Construction & Maintenance Co., Ltd.	2,638
Edison Swan Cables, Ltd.	2,664
Liverpool Electric Cable Co., Ltd.	2,678
W. T. Glover & Co., Ltd.	2,689

25,000 lamps for consumers' premises consequent on the alteration in pressure:—

	£
Albion Electric Lamp Works (1934), Ltd.	742 / 637*
L. Andrew & Co., Ltd.	691
British Glowlamp Works, Ltd.	742
British Thomson-Houston Co., Ltd.	1,404
Briton Lamps, Ltd.	693
Commercial Electric Co., Ltd.	852
Crompton Parkinson, Ltd.	1,108 / 1,178 / 867
Cryselco, Ltd.	1,404
Edison Swan Electric Co., Ltd.	1,404
Electric Lamp Service Co., Ltd.	748
Ensign Lamps, Ltd.	670
General Electric Co., Ltd.	1,404
J. Godden (London), Ltd.	892
Insular Electric Glowlamp Works, Ltd.	664
John Ismay & Sons, Ltd.	674
London Electrical Co.	2,055
A. S. McHugh & Co.	1,150
Metropolitan-Vickers Electrical Co., Ltd.	1,404
Omega Lampworks, Ltd.	742
Siemens Electric Lamps & Supplies, Ltd.	1,404
Z Electric Lamp and Supplies Co., Ltd.	1,404

* Subject to particular conditions.

It was recommended that the contract be divided between the General Electric Co., Ltd. (£766) and the Insular Electric Glowlamp Works, Ltd. (£332).

Weymouth.—Electricity Committee. Accepted. One 11,000-V truck type cubicle switchboard (£310) and one l.p. switchboard (£110).—Standard Switchgear Co., Ltd. Unit type pillars (£402).—Lucy & Co. E.h.p. 11,000-V and l.p. 660-V cables in the Dorchester Road area and the interconnecting of the eastern line at Overcombe and an additional feeder at Bond Street and Clarence Buildings (£6,300).—Johnson & Phillips, Ltd. Two 500-kVA transformers (£372).—Lindley Thompson Transformer & Service Co., Ltd.

Notes

"Old West Hammers"

An endeavour is being made to organise an "Old West Hammers" meeting, and for this purpose it is proposed to hold a dinner during the latter part of November in London. Past and present associates of the West Ham electricity undertaking are asked to communicate with the hon. secretary, Mr. A. Delves, "Trevose," Charteris Road, Woodford Green, Essex (telephone: Buckhurst 2111).

An Electrically-operated Bridge

A new road bridge to be erected to replace the existing timber bridge over the Forth and Clyde Canal on the Falkirk-Bonnybridge road, near Bonnybridge, is to be an electrically operated steel swing bridge and is to cost £13,762.

N.P.L. Papers

Included in the list of papers published for the National Physical Laboratory during July is one by Dr. A. H. M. Arnold on "The A.C. Resistance of Parallel Conductors of Circular Cross-section." This is included in the *Journal* of the Institution of Electrical Engineers, Vo. 77, p. 49.

The "Duke of York"

The new steamer built by Messrs. Harland & Wolff, Ltd., for the L.M.S. passenger traffic between Heysham and Belfast has a gross tonnage of 3,740, a length of 349 ft., and a breadth of 52 ft. The electrical requirements are provided at 110 V, d.c., by two 150-kW geared turbo-generators installed in the shaft tunnel. A 15-kW petrol-paraffin generator in the upper engine room provides for the emergency navigation lighting and bilge pumps; it can also be connected through links to the main switchboard. Provision is also made to enable a supply to be taken from the shore. The two electro-hydraulic steering gears are driven by 10-h.p. shunt motors. The windlass and capstan motors are of 28 h.p. and run at 430 r.p.m.; they are equipped with automatic time-element relays which operate in the event of stalling. In addition to the numerous motors of various sizes required for pumps, motors, cranes, winches, fire sprinklers and fans, there is a "Harlandic" system of synchronous electric clocks operated at 230 V single-phase 50 cycles. The supply for this is obtained from a motor alternator with special frequency control. The main galley and pantry is equipped with a 26-kW range, a 6.4-kW grill, and 2.86-kW toasters. The sheathed hotplate elements are cast into the 4-kW c.i. hotplates. Cold-storage and pantry refrigerators of ¾ and ½ kW are also installed. Electric heating is provided in the public rooms and in the officers' quarters.

The I.E.E. Regulations Amended

The Institution of Electrical Engineers has issued a series of alterations and additions to the 10th Edition of its "Regulations for the Electrical Equipment of Buildings." The points covered included the definition of a final sub-circuit; maximum currents and diversity factor; distinctive colours for cables; ventilation of battery rooms; walls of combustible materials; auto-transformers; luminous discharge tubes; earthing leads; and portable lighting fittings.

Electricity in Poultry Farming

In a leaderette last week we made reference to a publication with this title by Mr. C. A. Cameron Brown, B.Sc., A.M.I.E.E. This is published by the Institute for Research in Agricultural Engineering, University of Oxford, at the price of 2s.

Radio Detection Apparatus on the "Normandie"

The Paris correspondent of the *Daily Telegraph* reports that the liner *Normandie* has been fitted with a radio-electric apparatus for the detection and exact location at night or in fog of all objects in her vicinity. The apparatus is the invention of M. Ponte, a young French scientist.

Heat-proof Material

One of our readers asks for particulars of a new heat-proof foil which, he says, is suitable for use in heating devices. He thinks that it may be of German origin.

Educational

The Day Department of the Regent Street Polytechnic (School of Engineering) reopens on September 17th, and the entrance examination commences on September 10th. The evening departments reopen on September 23rd, and enrolments begin on September 16th.

(See our classified advertisements.)

Appointments Vacant

Teacher in electrical installation work at the Technical and Art Institute, Watford.

Mechanical and electrical supervisors for the Air Ministry.

Electric cookery demonstrator and showroom assistant for Darlington Corporation.

Junior mains draughtsman and lady demonstrator for Blackburn Electricity Department.

(See our classified advertisements.)

Makers' Names Wanted

WOOD'S earth tape.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. L. A. S. Wood, chief lighting engineer of the Westinghouse Electric & Manufacturing Co., New York, has been elected president of the American Illuminating Engineering Society. According to the *Electrical World*, from which the accompanying portrait is reproduced, Mr. Wood has been closely identified with the lighting industry ever since he began his business career. He was born in London, and received his education at the City of London School, the University of London, and Finsbury Technical College. He was connected with the Edison Swan United Electric Light Co. in the early days of the incandescent lamp, and later devoted many years to the development of the arc lamp. He took a leading part in planning street lighting systems in the larger European cities, and also the lighting of many of the public buildings for the British Government. He went to the United States in 1911 to introduce the flame carbon arc lamp, and was soon afterwards appointed arc lamp expert to the Westinghouse Co. He became associated with the George Cutter Co. as illuminating engineer, and was later appointed sales engineer. When the Cutter Co. was absorbed by the Westinghouse Co. Mr. Wood became manager of the company's street lighting department. He was appointed manager, lighting division, at the Cleveland works prior to his recent transfer to New York as chief lighting engineer.

Mr. L. A. S. Wood

Mr. C. Turnbull, who recently retired from the position of borough electrical engineer at Tynemouth, entertained to dinner on August 9th the staff and workmen of the Corporation Electricity Department. The Mayor, Councillor Hastie D. Burton, and the chairman of the Electricity Committee, Councillor G. Forsyth, who also attended, spoke in warm terms of Mr. Turnbull's services. Mr. Turnbull, in replying, recalled the days when bulk supply was unpopular in the town, while to-day the Electricity Department was a great asset. **Mr. J. B. Glen,** who has succeeded Mr. Turnbull as borough electrical engineer, presented him with a wristlet watch, suitably inscribed, and Mrs. Turnbull with a cut-glass rose bowl on behalf of the Department.

Mr. G. B. Gill, A.M.I.E.E., is on his way to China, to take up the post of general manager to the Hankow Light and Power Co. Mr. Gill served his apprenticeship with Messrs. Newtons of Taunton, and for five years was with the Underground railways at Lots Road power station under the chief mechanical engineer. He joined Messrs. Merz and McClellan in 1912, with whom he remained, excepting the war period, until 1932, representing them in India in connection with the electrification of the Bombay railways. During the war he served with the Northumberland Fusiliers, and on being invalided home, worked with Sir Arnold Gridley at the Ministry of Munitions, dealing with power supply matters.

Mr. P. W. Bignell, who describes the Eastbourne Electricity Department's scheme for the renovation of hired electric cookers in an article on page 235 of this issue, holds the position of domestic service engineer at Eastbourne, under Mr. J. K. Brydges, the borough electrical engineer.

Mr. P. W. Bignell

Mr. K. Battye, of Bristol, formerly technical assistant at the Worcester Corporation power station, and now a grid control engineer for the South-West of England and South Wales area of the Central Electricity Board, was married on August 15th to Miss Olive Hicks, of Claines, Worcester.

Mr. G. E. Harvey-Barnes is resigning from the position of manager of the Osram Valve Department of the General Electric Co., Ltd., and is shortly joining Gothic Electric Supplies, Ltd., where he will take charge of the electrical side of the business. He has been with the G.E.C. for ten years, and before going to that company was for two and a half years sales manager to a firm of radio wholesalers.

Mr. J. G. Barry, former senior vice-president of the American General Electric Co., has retired. According to *Power* he has been elected an honorary vice-president of the company.

Mr. S. Davey has been appointed sales engineer to the Croydon Engineering Co., Ltd.

Obituary

Professor John Anderson, who died last week, held the chair of surgery at the Union of St. Andrews. He conducted a research into high-frequency currents in surgery and produced a valuable book on the subject.

Mr. H. Watts.—The death has occurred at Sunderland, after a long illness, of Mr. Henry Watts, traffic superintendent for the Sunderland Corporation tramways undertaking for the last thirty years.

Bailie R. Scott.—The death occurred at Irvine, Ayrshire, on August 16th of Bailie Ritchie Scott, senior bailie of the burgh, and chairman of Ayrshire Electricity Board.

Sir Basil Blackett.—We regret to record the death, at the age of fifty-three, as the result of a motoring accident in Germany, of Sir Basil Phillott Blackett, K.C.B., K.C.S.I., the well-known financier. After distinguishing himself in the Civil Service he commenced a new career in the City, being elected to the Court of Directors of the Bank of England in January, 1929. In the same year he was appointed, with the approval of the Government, chairman of the newly formed Imperial and International Communications, Ltd. (now Cable and Wireless, Ltd.), and in December, 1930, he went to Canada to conduct important negotiations on behalf of his company. He resigned from the position of Government approved chairman of Imperial and International Communications, Ltd., and Cable and Wireless, Ltd., in 1932, in order to have more time for other public interests, but at the request of the Court of Directors he remained an ordinary director of both companies. He was on the boards of many concerns, including fifteen companies associated with Cable and Wireless, Ltd.

[Russell, London.

The late Sir Basil Blackett

Prof. H. Adams.—The death is reported of Professor Henry Adams, which occurred on August 16th at his home at Brockley, S.E., at the age of eighty-nine. For thirty-five years he was Professor of Engineering at the City of London College, and from 1905 to 1910 he was chief examiner (engineering) for the Board of Education. Prof. Adams was the inventor of the Adams vortex blast pipe for locomotives. He took up private practice in 1877, and went into partnership with his son in 1909. Among the works carried out by him were wharves, hydraulic machinery, workshops, and reinforced-concrete structures.

Mr. P. Morgan.—The death is announced in his fifty-ninth year of Mr. Percy Morgan, who was for some years lamp shop manager at the works of Crompton & Co., of Chelmsford, and was formerly with the British Thomson-Houston Co., Ltd., at Rugby.

Mr. W. E. Butcher.—We regret to learn of the death of Mr. Walter Edward Butcher, of the British Thomson-Houston Co., Ltd., which occurred on August 14th, after a short illness, at the age of sixty-two. Mr. Butcher joined the B.T.H. Co. in November, 1902, and was employed in the Contract Department at Rugby, and subsequently at the London office of the company.

Wills.—Sir Arthur Steel-Maitland, director of a number of companies, including the United Dominions Trust (Electric), Ltd., left £110,646.

Mr. E. L. Beck, of Corbridge-on-Tyne, for thirty-two years manager of the Newcastle office of the British Thomson-Houston Co., Ltd., left £1,032.

Mr. J. W. Dodds, of Cleadon Village, South Shields, managing director of the E.G.S. Co., Ltd., who died in April last left £5,662 (net personalty £3,638).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

International Majestic Radio Corporation, Ltd.—Private company. Registered August 12th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, importers, and exporters of and dealers in all kinds of electrical and wireless apparatus and instruments, &c. The subscribers are W. R. N. Fox, 30, Bramham Gardens, London, S.W.5, and L. C. Webster, 38, Fortis Green, East Finchley, N.2. Solicitors: Kennedy, Lindo & Co., 49, Queen Victoria Street, London, E.C.4.

A-Z Electrics, Ltd.—Private company. Registered August 8th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, radio, mechanical and general engineers, &c. The first directors are C. Canon, 2, Richborough Road, London, N.W.2, and M. Nathan, 59, Finchley Road, London, N.W.8.

Acoustic Products, Ltd.—Private company. Registered August 12th. Capital, £2,000 in £1 shares. Objects: To acquire the business of loudspeaker diaphragm manufacturers and general engineers now carried on by D. C. E. Marsh, C. A. May, and W. R. Stevenson, at 1a, Granville Place, King's Cross Road, London, W.C.1, as "Acoustic Products." The directors are A. S. Sinclair, 19, Kent View Avenue, Westcliff-on-Sea, and D. C. E. Marsh, 110, Trafalgar Road, London, S.E.15. Solicitors: Forbes & McLean, 8, Queen Street, Cheapside, London, E.C.

Moores (Electricians), Ltd.—Private company. Registered August 14th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless, electrical and mechanical goods, relayers of wireless reception, &c. The first directors are W. Moore, 6, Burnley Road, Padiham, Lancs, and two others. Registered office: 6, Burnley Road, Padiham, Lancs.

Wearside Radio Relay Service, Ltd.—Private company. Registered August 14th. Capital, £2,000 in 1,500 shares of £1 each and 2,000 shares of 5s. each. Objects: To construct and maintain wireless signal stations, and to carry on the business of wireless experts and dealers, &c. The directors are D. Ferrier, 4, Dunstable Road, Luton, and F. G. Ferrier, "Muedros," Biddick Road, New Washington, Co. Durham. Registered office: 2, Front Street, Washington, Co. Durham.

Radio Corner, Ltd.—Private company. Registered August 13th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in wireless and television receiving and transmitting apparatus, &c. The first directors are Flying Officer C. S. Goode, R.A.F. (retd.), "Abbotsford," Hinckley, and R. A. Kempton, "Roquaine," Sketchley Lane, Burbage, Hinckley.

Wallace & Lindsay, Ltd.—Private company. Registered in Edinburgh August 15th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and wholesale or retail dealers in wireless transmitting and receiving sets, component parts and accessories, &c. The first directors are T. Wallace, 51, Mardale Crescent, Edinburgh, and C. S. Lindsay, 29, Belford Avenue, Edinburgh. Registered office: 55, Morningside Road, Edinburgh.

Walbeck Electrical Co., Ltd.—Private company. Registered August 17th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in dynamos, motors, magnetos, batteries, &c. The directors are: E. Beckingsales, 90, Basidene Road, Hounslow, Mddx., and three others.

Pisagua Holdings, Ltd.—Private company. Registered August 16th. Capital, £250 in £1 shares. Objects: To acquire rights, interests and title of V. B. North in respect of and relating to the control of the lighting effect in electric luminous discharge tubes, and also relating to apparatus for operating the same which V. B. North has acquired under various agreements from S. P. Rety and J. Fodor. The subscribers are: E. J. Evershed, Thanet House, 231, Strand, W.C.2; and A. G. Pitts, Thanet House, 231, Strand, W.C.2. Solicitors: Evershed & Son, Thanet House, 231, Strand, W.C.2.

E. W. Harris & Co., Ltd.—Private company. Registered August 15th. Capital, £1,500 in 750 7 per cent. non-cumulative preference shares of £1 and 3,000 ordinary shares of 5s. Objects: To carry on the business of electrical engineers, makers and suppliers of apparatus and appliances for the purpose of stage, display and commercial lighting, &c. The first directors are W. E. Harris, 23, Elers Road, West Ealing, W.13, and others to be appointed by the subscribers. Registered office: 28, Gerrard Street, W.1.

Radiometers, Ltd.—Private company. Registered August 15th. Capital, £200 in 4,000 ordinary shares of 1s. each. Objects: To acquire the business of a radio consultant to the trade now carried on by G. E. Robson at 41, Harpenden Road, West Norwood, S.E.27. The directors are: G. E. Robson, 41, Harpenden Road, West Norwood, S.E.27; and J. H. H. Hawkins, 235, Elmhurst Mansions, Clapham, S.W.4. Registered office: 262, Norwood Road, S.E.27.

Glasgow Radio, Ltd.—Private company. Registered in Edinburgh August 14th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in all kinds of electrical, musical and other instruments and components in connection with wireless telegraphy, &c. The first directors are J. Glasgow and R. E. Glasgow, both of 8, South Park Drive, Paisley. Registered office: 105, Polmadie Road, Glasgow, S.

Returns of Electrical Companies

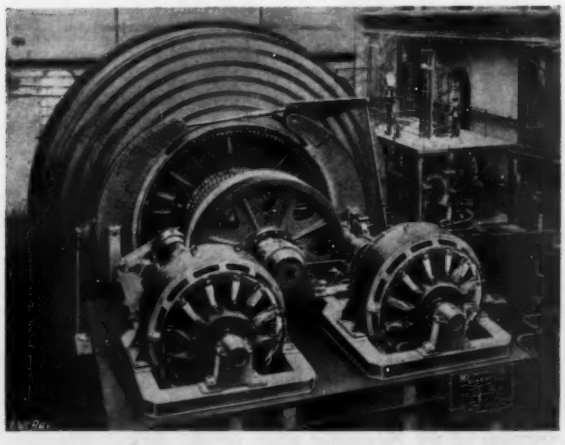
Granton Instrument Co., Ltd.—Debenture dated July 26th, 1935, to secure £50, charged on the company's property, present and future, including uncalled capital. Holder: Louis M. Galansky, Annadale, Okeover Road, Broughton Park, near Manchester.

Brondesbury Radio, Ltd.—Debenture dated August 6th, 1935, to secure £100, charged on the company's property, present and future, including uncalled capital. Holder: Leonard East, 2, Grange Road, Willesden Green, N.W.2.

S. Evans & Sons, Ltd.—The nominal capital has been increased by the addition of £3,800 in £1 ordinary shares beyond the registered capital of £1,200.

Winders for Deep Mines

FIVE duplicate electric winders supplied by the Metropolitan-Vickers Electrical Co., Ltd., to the New Consolidated Goldfields, Ltd., of South Africa, have now been put into commercial service. Three of the winders raise ore from a depth of 6,660 ft., and two from 6,300 ft., all in a single vertical lift, these depths being greater, we believe, than any for which such winding plants have hitherto been constructed. The load is raised throughout the greater part of the wind at 3,000 ft. per min.



One of the winders described in this article

A net load of 16,000 lb. of ore is raised in a skip, weighing 9,000 lb., by a 2-in. diameter flattened-strand pattern rope weighing over 20 tons. The wind occupies 166.2 sec., of which 5 sec. is the decking time for simultaneously emptying and loading the skips.

The two bi-cylindro-conical 127-ton drums in each winder, with diameters of from 35 ft. to 13 ft., are built from cast-steel sections, and are connected to the 28-in. main drum shaft by cast-steel clutches 8 ft. 4 in. in diameter. Either drum can be used for an unbalanced wind. The main gear wheel and the two driving pinions are of Metropolitan-Vickers manufacture. They have a ratio of 8.25 to 1 and have double helical involute teeth. The main wheel is 12 ft. 6 in. in diameter by 3 ft. 5½ in. width of face.

The two reversing 660-V d.c. motors are each rated at 1,810 r.m.s. and 3,300 peak h.p. at 225 r.p.m. The motors are Ward-Leonard controlled. Three of the five motor-generator sets consist of a 3,580/7,500 h.p. 740 r.p.m. induction motor driving two 1,430/2,880 kW d.c. generators and a 31-kW exciter; the others are equipped also with the Metropolitan-Vickers Stubbs-Perry system, comprising a 48-ton 12-ft. diameter flywheel, a 6.5 to 1 single-reduction gearing, and a 3,000/3,400 h.p. steam turbine.

The suspended parallel-motion brakes are applied by means of a dead weight of 4,160 lb., and released by a separate oil-brake engine for each drum. Each winder is fitted with a Metropolitan-Vickers brake governor which limits the rate of retardation to a predetermined value. Each winder is also equipped with two Lilly overwind and overspeed prevention devices; these consist of a centrifugal governor which follows the speed of the winder and dial-mounted cams which register the position of the cage; the co-ordinated action of these elements operates electrical contacts which provide against overspeed, overwind, too rapid acceleration, delayed retardation, starting in the wrong direction, and in emergency cut off the supply to the winder and apply the brakes. The drums, brakes and control platform were made by Messrs. Fullerton, Hodgart & Barclay.

Nottingham Rediffusion Service, Ltd.—Satisfaction in full on July 22nd, 1935, of debenture dated December 3rd, 1934, and registered December 5th, 1930, securing £5,000.

Claude-General Neon Lights, Ltd.—The nominal capital has been increased by the addition of £300 beyond the registered capital of £218,000. The additional capital is divided into 6,000 founders' shares of 1s. It was resolved that 2,520 of such founders' shares be allotted to David Allen Neon Displays, Ltd., and that 5,520 ordinary shares of 1s. be also issued to David Allens. The directors were also to hold 4,598 of the unissued preference shares for the purposes of satisfying the option of David Allens to apply for such shares under an agreement dated May 23rd, 1935.

London Transformer Products, Ltd.—Debenture dated August 1st, 1935, to secure such sums not exceeding £600 as the company may draw on the lender's account at Barclays Bank, Ltd. Property charged: The company's undertaking and property, including uncalled capital and goodwill. Holder: Thomas Scott Worthington, "Westwood," 111, Court Road, Eltham, London, S.E.9.

Newman, Sons & Co., Ltd.—Particulars filed of £10,500 debentures authorised July 25th, 1935 (ranking *pari passu* with debentures dated May 28th, 1934), charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Alandale Radio & Television Co., Ltd.—Debenture dated July 31st, 1935, to secure £252 charged on the company's property, present and future, including uncalled capital. Holder: Mrs. Lily King, 27, Little Heath, London, S.E.7.

Eastnor Electric Co., Ltd.—Capital, £500 in £1 shares. Return dated June 22nd, 1934 (filed May 3rd, 1935). 300 shares taken up. £300 paid. Mortgages and charges, nil.

Priorsells, Ltd.—Capital, £2,500 in 1s. shares. Return dated January 11th, 1935. All shares taken up. £2,500 paid. Mortgages and charges: £600.

Flather & Co., Ltd.—Capital, £20,000 in £1 shares. Return dated January 10th, 1935. 13,208 shares taken up. £11,708 paid, £1,500 considered as paid. Mortgages and charges, nil.

A. F. Yarnold, Ltd.—Capital, £2,000 in 500 preference and 1,500 ordinary shares of £1. Return dated December 31st, 1934 (filed May 4th, 1935). 350 preference and 885 ordinary shares taken up. £1,035 paid on 350 preference and 685 ordinary shares, £200 considered as paid on 200 ordinary shares. Mortgages and charges, nil.

Painton & Co., Ltd.—The nominal capital has been increased by the addition of £700 in £1 ordinary shares beyond the registered capital of £300.

Metropolitan Rediffusion Services, Ltd.—Issue on July 29th, 1935, of £150 debentures, part of a series already registered.

Burgoyne Wireless (1930), Ltd.—Satisfaction on July 18th, 1935, of mortgage dated June 26th, 1934, and registered July 11th, 1934. (According to the register of mortgages, the mortgage registered July 11th, 1934, originally secured £6,000.)

Debenture dated July 18th, 1934, to secure £9,500, charged on the company's undertaking and freehold land and buildings in Great West Road, Ealing, Mdx., and all other property, present and future, including uncalled capital. Holder: Reuben H. Dent, The Chuocks, Compton Avenue, Hampstead, N.W.

Radio & Allied Sales, Ltd.—Capital £5,000 in £1 shares. Return dated January 14th, 1935. All shares taken up. £2,000 paid (£1 per share on 2 shares and 8s. per share on 4,998 shares). Mortgages and charges, nil.

Electric Lamp Service Co., Ltd.—Capital, £2,000 in £1 shares. Return dated January 14th (filed March 2nd), 1935. All shares taken up. £2,000 paid. Mortgages and charges, nil.

City Notes

The Constantinople Telephone Co.—A *Reuter* message from Istanbul states that an agreement in principle has been reached between the Turkish Minister of Public Works and representatives of the Istanbul (Constantinople) Telephone Co. for the purchase of the company's concession by the Turkish Government. The agreement provides for a total payment of £800,000 in twenty annuities, starting in 1939. The Turkish Government is to take over shortly. This agreement is the latest development in the Government's campaign for the progressive nationalisation of all foreign capital enterprise functioning in Turkey. The concession was granted to the company in 1911, and notification of the Government's intention to purchase the undertaking was received in July last year. The company, of which Mr. J. E. Kingsbury is president, has an authorised capital of £T.495,000 in £T.5.50 shares, of which £T.330,000 is issued and paid up.

Cable & Wireless (Holding) Ltd.—At an extraordinary meeting held on August 15th a resolution was passed reducing the capital of the company from £53,700,000 to £47,246,593 by cancelling £6,453,407 of the 5½ per cent. cumulative preference stock, together with all accrued dividends, the company paying to the stockholders the capital paid up, together with interest at the rate of 3 per cent. per annum (less tax) from July 31st last until the last day of the month in which the confirmation of the Court is obtained.

The Paterson Engineering Co. reports a profit for the year ended April 30th last of £22,487, as compared with £19,704 in the preceding year. After deducting directors' fees, dividend on preference shares for four months to April 30th, income-tax, &c., there is a balance of £10,763, which with £4,933 brought in makes £15,279. It is proposed to pay a dividend of 10 per cent. (same) and to carry forward £7,529.

Waste Heat & Gas Electrical Generating Stations, Ltd., has announced an interim dividend of 2½ per cent. (same).

J. & F. Stone Lighting & Radio, Ltd., held an extraordinary meeting on Friday last when resolutions were passed approving a conditional agreement with Distrlct Supplies, Ltd., increasing the capital to £300,000 and making alterations in the articles. Mr. J. C. Gardner, who presided, said that the trading of the company for the six months to December last had been up to expectations and since the meeting in September seven new shops had been opened in London and the provinces. An opportunity had now arisen of acquiring District Supplies, Ltd., which had built up an organisation similar to theirs. The shops that they proposed to acquire numbered thirty-two, situated in London and the provinces. To provide the purchase price of £73,000 cash and £60,000 in fully paid ordinary shares it was proposed to increase the capital from £155,000 to £300,000 by issuing for cash £85,000 of 6 per cent. redeemable preference shares and to issue at par fully paid to the vendors 240,000 ordinary shares of 5s. each. All shareholders would have an opportunity of participating in the issue of preference shares.

The Palestine Electric Corporation, Ltd., reports a gross profit for 1934 of £P.242,342, as against £P.149,298 for the preceding year, and after deducting depreciation, debenture interest, and tax, there is a net balance of £P.165,511 (against £P.80,887). As announced in our last issue, the ordinary dividend is raised to 7½ per cent., tax free (against 5 per cent., tax free), and £P.25,000 is transferred to tax and contingencies reserve and £P.70,000 to general reserve, leaving a balance to be carried forward of £P.34,239 (against £P.34,050). The number of consumers increased during the year by 13,463 to 35,397 and the kWh sold by 14,248,676 to 34,385,515. Large extensions have been carried out to meet the growing demand for energy and good progress has been made in the construction of the new Haifa power station, from which electricity is already being supplied. In December last the authorised capital was increased to £2,500,000. Meeting: September 5th.

The General Electric Co., Ltd.—According to Press reports a London group headed by Messrs. Lazard Bros. & Co., Ltd., has completed arrangements for the acquisition from American holders of a large block of shares in the General Electric Co., Ltd. It is understood that with the repatriation of these shares, the whole of this company's share capital, with the exception of a few isolated holdings, will be held in Great Britain. The Treasury has given permission for the conclusion of the transaction, in view of the special circumstances and it has been possible to carry it through without any undesirable effect on the Anglo-American exchange.

Chadburn's (Ship) Telegraph Co., Ltd., reports a gross trading profit for the year ended March 31st last of £14,783 as compared with £5,577 for the preceding year. To this is added fees, rents, &c., amounting to £636, making £15,419, from which is deducted rents, rates, board's remuneration, income tax, depreciation, &c., leaving a net profit of £3,114 (against a loss of £4,515). This reduces the debit balance brought in to £1,292. At meetings to be held on September 4th proposals will be submitted for the reorganisation of the capital.

The Clyde Valley Electrical Power Co. has declared an interim dividend of 3 per cent., less tax (unchanged).

Stocks and Shares

TUESDAY EVENING.

THE war clouds over Italy and Abyssinia have deepened perceptibly during the past week, and with noticeable malinfluence upon most of the markets in stocks and shares. The general effect has been to lay a pronounced restraint upon the hand of investment and of speculation. Theoretically speaking, it should make but little difference to gilt-edged securities, since the traditional result of any such possibility is the driving of money into British issues. Capital usually flows towards the safety-first securities such as are to be found chiefly in the stocks of this country. Practice has shown, however, that imminent threats of war bring about a feeling of uncertainty which finds reflection in an immediate shrinkage of Stock Exchange business, with a consequent lowering of prices. The boomlet in Industrial shares, such an outstanding feature of the past few weeks, has received a sharp check. Prices are lower in a good many cases, and the falling off in activity is accentuated, of course, by holiday conditions which, although they have exercised little influence up to the present, are now making themselves felt in somewhat depressing fashion.

Gilt-Edged Stocks

Prices of Central Electricity and similar stocks have not been affected by the dullness that attacked the more volatile securities handled by the Consol market. London & Home Counties 4½ per cent. stock is, indeed, a point better at 114. London Passenger Transport stocks keep very steady, and the "C" stock rose to 100 upon an announcement by the board that a statement is to be made in connection with the dividend on this stock on October 3rd. This served to direct fresh public attention to the speculative, as well as the investment, outlook for Transport "C" as it is called in the market The optimists, as mentioned here last week, are looking for 3 per cent. and the more cautious party for 2½ per cent., which would make 4½ per cent. or 4 per cent. respectively for the full year. The amount of fixed-interest stock actually on offer in the market continues to be very limited. Of the British Government guaranteed 2½ per cent. stock recently offered by the London Electric Transport Finance Corporation there is £50,000 available at 97¼ free of stamp. This will give 2½ per cent. outright and £2 12s. 6d. per cent. assuming redemption at the later of the two dates, 1950-1955, attached to this issue.

Cable and Wireless

The new stocks lately offered by Cables Investment Trust are a trifle lower, the preference at 5s. 6d. premium and the 3½ per cent. debenture stock at 12s. 6d. premium. Investment continues to absorb the issues and the prices would probably have responded to this demand had it not been for

the war clouds already mentioned. Last week's meeting of Cable and Wireless produced an interesting speech from the chairman; but, from the market point of view, the result was a little disappointing. Prior to the meeting the "A" ordinary had touched 23¾ but afterwards reaction set in and the price fell away. Upon publication of the unsatisfactory traffic figures for July, Cable "A" went back to 25. A rally to 26 left the price 1¼ down on the week. The "B" stock lost 5s., the preference 2¼ points. Globe Telegraph & Trust ordinary and preference weakened in sympathy. Anglo-Portuguese Telephone shares are steady at 30s. 6d., Great Northerns hold their rise at 40.

Electricity Supply Shares

The marking ex dividend of a number of ordinary shares in the list of home electricity companies brought in a certain amount of investment buying, and, as noted last week, the amount of the dividends was recovered in the majority of cases. The dullness which overtook other investment markets made little headway in that for electricity supply shares. North Metropolitans are better at 61s. 3d., County of London, City of London and Metropolitans are all sixpence better. North Easterns rose to 34s. 6d., Scottish Power shares to 43s. 9d. In the provincial group 500 Lancashire Electric old ordinary shares are on offer at £2 each, which includes the dividend of 2¼ per cent. payable next month. The yield on the money is 3¾ per cent. without taking into account the 6d. per share dividend included in the price. London Associated Electricity Undertakings ordinary are still on offer at 35s. 9d. ex the interim dividend of 3 per cent. recently declared. At this price, the return comes to £3 18s. 3d. per cent. on the money.

Palestine "A" shares, after their substantial rise, have gone back 1s. 6d. to 49s. In the Indian group, Calcutta ordinary at 67s. have shed 1s. The Perak River Hydro-Electric Power Company has received judicial sanction for its scheme of capital rearrangement. The 7 per cent. debentures are 3¼ down at 58.

General Electrics

The Treasury has given permission for the purchase by a London group of financiers of a block of some 400,000 ordinary shares in the General Electric Co., Ltd. According to report the shares have been taken on the basis of £3 per share, and it is further stated that another 350,000 shares are still the subject of negotiation. The deal recalls the excitement that prevailed some seven years ago when the Americans were buying, with both hands, shares in some of the best-known British companies connected with industry. To such lengths did this acquisitive movement proceed that in a few cases, amongst them that of the General Electric, steps were taken to retain control of the companies in British hands. At that time the General Electric created 1,600,000 ordinary shares of £1 each that were labelled "British" ordinary shares. The Americans objected, and although the shares remained in being they were never issued. This repatriation, as it may be called, of shares follows somewhat similar action in the cases of the English Electric Company and, more recently, of the International Automatic Telephone Company

Manufacturing and Equipment

Decided check has been given to the upward swing of prices in the market for electrical manufacturing and equipment shares. During the past few weeks the movement has been almost uniformly upward, but, owing to the factors already mentioned, a halt has been called to the buying of industrial shares. This has affected a number of those in the manufacturing section. English Electrics, for instance, both ordinary and preference, are ⅛ down, General Electrics have gone back to £3, Associated Electrical Industries ordinary are 3s. lower at 35s., and British Aluminiums, at 44s., show a fall of 2s. 9d. On the other hand, British Insulated at 4¼ have put on half a crown. Johnson & Phillips, Telegraph Constructions, Siemens, and Electric Constructions have all given way. Ericssons at 7½ are 7s. 6d. lower, and amongst other shares to suffer reaction are Telegraph Condensers 48s., Enfield Rolling Mills 27s., Telephone Manufacturing 7s. 7½d., Hall's Telephone 22s. 6d., and International Automatic Telephone ordinary 41s. 3d. The falls range from 6d. to 1s. per share.

American Factors

The financial position in the Americas should be, on paper, far removed from the influence of Italian politics. Yet the sympathy that knits one Stock Exchange market to the next is at work in American, as it is in home, issues. The speculator, mistrustful of the general outlook, treats American shares with the same degree of caution that he applies to others. The New York and Montreal operators, sensing the changed attitude in London, are working with caution. Prices that, a few days back, were apparently on the point of booming, have reacted from the best, and are but moderately higher where changes have occurred. Clearly, however, the prestige of President Roosevelt has been weakened by a series of incidents whose importance consists less in their individual consequence than in their growing number. He is doing none too well in his drive against American utilities. American Telephone and Telegraph shares are 2 points better at 141½, but Internationals, at 11¼, have shed a point. Of the Canadian shares, Montreal Common remain at 33¼ and Shawinigan at 19.

Share List of Electrical Companies

Home Electricity Companies.

	Nom.	Dividend 1933.	Dividend 1934.	Price Aug. 20.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	4	—	3 15 0
Brompton Ordinary	1	7	7	34/-xd	—	4 2 4
Charing Cross Ordinary	1	7	7	34/6	—	4 1 2
Chelsea	1	7	7	34/6xd	—	4 1 2
City of London	1	7½	7½	38/3	+6d.	3 18 5
Clyde Valley	1	7	8	44/-	—	3 12 9
County of London	1	10½	10½	59/6	+6d.	3 10 7
Edmundson's 7% Pref.	1	7	7	36/-	—	3 16 9
Elec. Dis. Yorkshire	1	9	9	50/-	+6d.	3 12 0
Elec. Supply Corporation	1	11	11	3 3/8	—	3 8 9
Kensington Ordinary	1	7	7	34/6xd	—	4 1 2
Lancs Light and Power	1	7½	7½	39/6	+6d.	3 16 0
London Electric	1	7	8	38/6xd	—	4 3 0
Metropolitan	1	10	10	54/-xd	+6d.	3 14 1
Midland Counties	1	7	7	39/-	-6d.	3 11 1
Mid. Elec. Power	1	8	8	42/6	—	3 15 3
North Eastern Electric Ordinary	1	6	6	34/6	+6d.	3 9 7
Do. 7% Pref.	1	7	7	36/-	—	3 17 9
Northampton	1	10	10	53/9xd	—	3 14 1
Notting Hill 6% Pref.	10	6	6	14¾	—	4 1 4
North Met. Elec. Ordinary	1	10	10	61/3xd	+6d.	3 5 3
Do. do. 6% Pref.	1	6	6	32/6	-6d.	3 13 10
St. James and Pall Mall	1	7	8¼	34/-xd	—	4 17 1
Scottish Power	1	8	8	43/9	+ 3/8	3 13 2
South London	1	7	7	36/-	—	3 17 9
Westminster Ordinary	1	7	7	34/6xd	—	4 1 2
Whitehall Elec. Invst. 7¼% Pref.	1	7¼	7¼	25/-	—	6 0 0
Yorkshire Elec.	1	8	8	45/6	—	3 10 4

Public Boards.

Central Electricity, 1950–70	Stock	5	5	116	—	4 6 2
Do. 1955–75	„	5	5	120	—	4 3 4
Do. 1951–73	„	4½	4½	110	—	4 1 10
Do. 1963–93	„	—	3½	104	—	3 7 0
London & Home Counties, 1955–75	„	4½	4½	114	+1	3 19 0
London Passenger Transport, A...	„	—	4½	124½	—	3 12 3
Do. do. B...	„	—	5	127½	—	3 18 9
Do. do. C...	„	3	—	100	+1	3 0 0
West Midlands Joint Elec. 1948–68	„	—	5	115	—	4 7 0

Telegraph and Telephone.

American Tel. & Tel.	$100	9	9	141½	+2	6 7 3
Anglo-Am. Tel. Pref.	Stock	6	6	116½	—	5 3 0
Do. Def.	„	1½	1½	27½	—	5 9 1
Cable & Wireless 5½% Pref.	„	2¾	4½	101	-2½	4 1 8
Do. A. 7½% Ord.	„	Nil	Nil	26	-1½	—
Do. B. Ord.	„	Nil	Nil	7½	-½	—
Globe Tel. & Tel. Ord.	10	2½	3½	13¾	-⅜	2 12 10
Do. do. Pref.	10	6	6	13¾	-½	4 7 3
Great Northern Tel.	10	20	20	40	—	5 0 0
Marconi-Marine	1	10	7½	33/9	—	4 9 0
Oriental Telephone Ord.	1	12	12	3½	—	*3 13 10

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	-6d.	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	„	5	5	1200	-25	—
Do. do. Pref. Ord.	„	8	8	181½	+2	4 8 2
Brazil Traction	100	—	—	7⅛	-⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	98½	—	5 1 6
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	$500	5	5	40½	—	—
Victoria Falls Ord.	1	20	20	8¾	-¼	2 5 9
West Riding	1	5	6½	36/3	+⅛	3 11 8

Manufacturing Companies.

Aron Electricity Ord.	1	10	15	3	—	5 0 0
Assoc. Elec. Ord.	1	4	6	35/-	-3/-	3 8 7
Do. Prf.	1	8	8	37/6	—	4 5 4
Babcock & Wilcox	1	6	8	52/6	—	3 1 0
British Aluminium Ord.	1	5	7½	42/3	-2/9	3 10 7
British Insulated Ord.	1	5	15	4¼	+¼	3 5 0
Brush Ord.	Stock	Nil	Nil	42½	—	—
Callender's	1	15	15	3 3/8	—	3 18 9
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/-	—	12½	3¾	- 1/8	3 14 0
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Edison Swan 1st Pref.	1	7½	7½	27/6	—	5 9 0
Electric Construction	1	Nil	3½	26/-	-1/-	2 13 10
Enfield Cable Ord.	1	25	25	5 1/8	—	4 16 5
English Electric	1	Nil	Nil	18/9	- 1/8	—
Do. do. Pref.	1	Nil	Nil	22/6	- 1/8	—
Ever Ready	5/-	35	35	24/3	—	7 4 8
Ferranti Pref.	1	7	7	28/-	—	5 0 0
G.E.C. Pref.	1	6½	6½	33/9	—	3 17 4
Do. Ord.	1	8	10	3	-1/-	3 6 8
Henley's	1	30	30	7	—	4 2 10
Do. 4½% Pref.	5	4½	4½	5½xd	—	3 16 8
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	5	7½	42/6	-2/-	3 10 7
Siemens Ord.	1	6½	4	23/9	- 1/8	3 7 3
Telegraph Construction	£1	Nil	Nil	25/-	- 1/8	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

28606. "Closed-circuit respiratory apparatus." S. Herman. October 16th, 1933. (Convention date not granted.) (432344.)

29263. "Braun tubes and circuits therefor." Radioakt-Ges., D. S. Loewe and K. Schlesinger. October 25th, 1932. (Cognate application 29264-33.) (432209.)

35988. "Automatic impulse transmitters." H. Hirschfeldt. December 21st, 1933. (432211.)

36020. "Electric-discharge tubes." O. Stettler. December 21st., 1933. (Convention date not granted.) (432350.)

36626. "Electrodes for sparking-plugs and other electrical contacts." Mond Nickel Co., Ltd., and J. McNeil. December 29th, 1933. (432484.)

36653. "Television and like systems employing cathode-ray tubes." A. D. Blumlein. December 29th, 1933. (432485.)

1934

1855. "Television or like systems." Automatic Electric Co., Ltd., and L. M. Simpson. January 18th, 1934. (432199.)

1978. "Amplifying arrangements for use in electrical signalling systems." A. C. Cossor, Ltd., and O. S. Puckle. January 19th, 1934. (432268.)

2077. "Incandescent electric lamps." J. Ismay and Sons, Ltd., and J. Ismay. January 20th, 1934. (432354.)

2192. "Electric motors." British Thomson-Houston Co., Ltd. January 26th, 1933. (432203.)

2332. "Thermionic oscillators." P. D. Tyers. January 23rd, 1934. (432426.)

2407. "Electric clocks and other time-keeping apparatus." W. E. Burnand. January 24th, 1934. (432272.)

2421. "Tuning arrangements or devices for radio-receiving apparatus." E. K. Cole, Ltd., E. J. Wyborn and A. W. Martin. January 24th, 1934. (432427.)

2485. "Electric motors." British Thomson-Houston Co., Ltd. January 27th, 1933. (432492.)

2527. "Telephone systems." Automatic Electric Co., Ltd., G. T. Baker and I. T. Richards. January 24th, 1934. (432281.)

2576. "Protective arrangements for electric circuits." Siemens Bros. and Co., Ltd., and G. W. Sutton. January 25th, 1934. (432428.)

2585. "Vehicle electric lamps." J. Lucas, Ltd., and R. L. Neill. January 25th, 1934. (432357.)

2661. "Electric arc convertors." General Electric Co.. Ltd., and E. Gallizia. January 25th, 1934. (432363.)

2753. "X-ray photography." I. G. Farbenindustrie Akt-Ges. January 26th, 1933. (432432.)

2776. "Dielectrics." British Thomson-Houston Co., Ltd. January 26th, 1933. (432284.)

2777. "Control of electric motors." British Thomson-Houston Co., Ltd., and R. D. Given. January 26th, 1934. (432433.)

2778. "Electric-discharge devices." British Thomson-Houston Co., Ltd., and F. P. Whitaker. January 26th, 1934. (432434.)

2861. "Electric motor control." British Thomson-Houston Co., Ltd., W. J. Pool and R. D. Given. January 27th, 1934. (432499.)

2868. "Directional radio receiving installations suitable for use for position finding and navigation purposes." Marconi's Wireless Telegraph Co., Ltd., and C. S. Franklin. January 27th, 1934. (432500.)

2888. "Methods and apparatus for reproducing film pictures on a screen of incandescent lamps." K. Rosenberg and H. Rosenberg. February 3rd, 1933. (432501.)

3066. "Electrical couplings of the plug-and-socket type." J. A. Crabtree. January 30th, 1934. (432440.)

3080. "Electric-clock system for ships." H. C. MacEwan and F. E. Rebbeck. January 30th, 1934. (432286.)

3244. "Radio receivers embodying loud-speakers." Burndept, Ltd., and R. P. Richardson. January 31st, 1934. (432217.)

3454. "Electric heating appliances." G. H. Collins and H. F. Collins. February 2nd, 1934. (432218.)

5331. "Electric-discharge tubes." Quarzlampen-Ges. February 17th, 1933. (432442.)

5888. "Television systems." A. C. Cossor, Ltd. February 22nd, 1933. (432225.)

7565. "Regenerative braking systems for electric motors." English Electric Co., Ltd., and J. C. Wilson. March 9th, 1934. (432292.)

7652. "Electric cables." Henley's Telegraph Works Co., Ltd., W. T. and J. R. G. Little. March 10th, 1934. (432293.)

7903. "Indicators for displaying variable information." Ericsson Telephones, Ltd., C. W. Wilman and C. C. Trapp. March 13th, 1934. (432447.)

9711. "Electric switches or circuit-breakers of the kind provided with separable electrodes, the arc gap between which is adapted to be swept by a stream of fluid." General Electric Co., Ltd., W. G. Thompson and E. Marx. March 28th, 1934. (432453.)

10719. "Electric timepieces." M. P. Favre-Bulle. April 10th, 1933. (Cognate application 10720-34.) (432299.)

11570. "Electric storage cooker." General Electric Co., Ltd., and O. W. Humphreys. April 17th, 1934. (432300.)

11594. "Electric control systems for elevators, hoists and the like." G. D. Smith and Associated Electrical Industries, Ltd. April 17th, 1934. (Addition to 357176.) (432234.)

12033. "Electric irons." W. H. Johnstone. April 21st, 1934. (432305.)

12095. "Television systems." Communication Patents, Inc. September 28th, 1933. (432455.)

14179. "Mercury-arc rectifiers." British Thomson-Houston Co., Ltd., and F. P. Whitaker. May 10th, 1934. (Addition to 394361.) (432236.)

14377. "Electric junction boxes." W. T. Henley's Telegraph Works Co., Ltd., and W. R. Clements. May 12th, 1934. (432237.)

14525. "Sockets for tubular electric light sources." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Gluhlampen). May 14th, 1934. (432459.)

14993. "Electric fusible cut-outs." T. W. Mackay and H. A. Knowles. May 18th, 1934. (432313.)

18098. "Overhead electric-cable supports." W. W. Triggs (F. Weber & Co.). June 19th, 1934. (432509.)

18814. "Bogie trucks for rail vehicles." E.M.B. Co., Ltd., G. N. Cadbury, and S. Smith. June 25th, 1934. (432510.)

18843. "Electric-discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges., für Elektrische Gluhlampen), June 26th, 1934. (432511.)

19268. "Luminous electric-discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Gluhlampen). June 29th, 1934. (Cognate application 6735/35.) (432320.)

20356. "Electrical connector." W. W. Triggs (Garfield Manufacturing Co.). July 11th, 1934. (432241.)

24078. "Time-governed control means for combination with electric service sockets or plugs." J. A. Hart. August 23rd, 1933. (432324.)

29863/4. "Cathode disintegration." P. Alexander and Dispersion Cathodique Soc. Anon. October 18th, 1934. (432469/70.)

31267. "Compensation elements for reducing the cross-talk in trunk communication cables." Siemens & Halske Akt.-Ges. October 31st, 1933. (432515.)

31995. "Multi-speed electrical device for a press or other machine tool." A. Herbert, Ltd. (Maschinenfabrik Weingarten vorm H. Schatz Akt.-Ges.). November 7th, 1934. (432398.)

33576. "Impulse transmitters for automatic telephone systems." J. Servanton and J. M. Consaël. November 24th, 1933. (432334.)

34830. "Method for the production of flexible insulation on electric conductors from polystyrol cellulose derivatives or similar substances." Siemens & Halske Akt.-Ges. December 4th, 1933. (432407.)

35889. "Electric reflector lamps." Elektrotechnische Fabrik Schmidt & Co., Ges. December 14th, 1933. (Cognate application 35890/34.) (432340.)

36753. "Electric liquid-jet commutators and interrupters." J. F. G. P. Hartmann. December 22nd, 1933. (432250.)

1935

4136. "Electrical condensers." P. A. Sporing and Telegraph Condenser Co., Ltd. February 8th, 1935. (432257.)

5271. "Electric plug-in couplings combined with switches." T. M. Mhitarian and M. H. Goldstone. February 19th, 1935. (432259.)

12369. "Fluid-operated electric switches." British Thomson-Houston Co., Ltd. April 24th, 1934. (432264.)

12856. "Electric circuit-interrupters." Westinghouse Electric & Manufacturing Co. May 26th, 1934. (432266.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 14th :—

Vaklene. No. 560824. Class 6. Vacuum cleaning machines and parts thereof.—H. J. Searle & Sons, Ltd., 70-76, Old Kent Road, S.E.1.

Dualnox (lettering and design). No. 561214. Class 13. Electric lamps (ordinary).—Nox Electric Lamp Co., Ltd., Clarence Road Works, Hunslet, Leeds.

A Bristol Boot Factory

MORE than seventy motors with control gear manufactured by the General Electric Co., Ltd., are used at the Bristol factory of the Holdfast Boot Co., Ltd. These three-phase squirrel-cage protected machines are operated by automatic push-button direct-to-line starters. Power is taken from the three-phase, 50-cycle, 365-V mains of the Bristol Corporation.

While much of the machinery employed for the preparation of the component parts of the boots and shoes and also those units performing the initial stages of assembly are suitably grouped and driven from line shafting, there are many finishing processes which are much more economically adapted to individual drive.

Leather-cutting machines are operated by line shafting which is belt-driven by a 5-h.p. motor. The parts for the uppers can be cut directly to the required shapes, but the soles have to be suitably curved in a specially designed form of press. In the preparing and press room four "Witton" motors are mounted on wall brackets driving line shafting through Hans Renold chains. Three are of 7½ h.p. and one of 15 h.p. capacity.

For sewing together the parts which form the upper there are six sewing machines to each bench, these being belt-driven from line shafting beneath the bench. The power unit is a 2-h.p. motor equipped with chain drive. Various finishing machines are individually driven by 2- or 3-h.p. squirrel-cage motors with push-button operated starters.

The wiring and installation work was carried out by Messrs. C. C. Shackleton, of Bristol. An illustration of the factory appears on page 246.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—R.C. school; J. A. Ogg Allan, architect, 25, Union Terrace.

Ashton-under-Lyne.—Cinema, Stockport Road, for Verona Cinema (Guidebridge), Ltd.

Ayr.—Houses (38); burgh surveyor.

Barnsley.—Washhouses at the junction of Princess Street and New Street; borough engineer.

Beddington.—Library, Woodcote Road, Wallington; S. F. R. Carter, engineer and surveyor, Council Offices, Woodcote Road, Wallington.

Berkhampstead.—Houses (20), Hazel Road; U.D.C. surveyor.

Bicester.—Mansion (£80,000), Middleton Park, for the Earl of Jersey; J. Parnell & Son, builders, Rugby.

Birkenhead.—Houses (198), Woodchurch Estate (£122,640); borough engineer.

Birmingham.—Public elementary school (300 places), Frankley Beeches Road, Northfield; Education Offices.

Bournemouth.—Houses (84), Kinson, and building for exhibitions, indoor sports, &c.; borough engineer. Houses (44), Saxonhurst Road; Davis Estates, Ltd. Church, Colemore Road, Iford; Rev. C. W. Caulfeild Browne. Hotel, Bath Road; Chine Investments, Ltd.

Carlisle.—Workshops, Lonsdale Street (£20,000) for the Management Committee of the Cumberland, Westmorland, and Carlisle Workshops for the Blind; S. W. B. Jack, architect, 33, Warwick Road.

Carmarthenshire.—County offices and buildings (£93,500); county architect.

Carshalton.—Cinema, café, dance hall, shops and offices (electrical work), St. Helier Avenue; H. Weston, architect, Epsom.

Chard.—Houses (28), Southchard; R.D.C. housing architect.

Chichester.—Houses (20), Spitalfield Lane; F. C. Nash, North Street.

Church Langton (LEICESTERSHIRE).—Primary school; Hanbury's Charity Governors.

Clacton-on-Sea.—Houses (48) and bungalows, Gorse Lane, for the Cargill Development Co. Cinema, West Avenue and Jackson Road; C. Bryant & Sons, Ltd., builders, Whitmore Road, Small Heath, Birmingham.

Colchester.—Houses (22), Lexden and Sheepen Road; borough engineer.

Coupar Angus.—Houses (40); R. W. Lowe, burgh surveyor, Taybank, Blairgowrie.

Crewe.—Bus garage, March Street, near Queen Street, for the Crosville Motor Services, Ltd., Crane Wharf, Chester; R. C. Cowmeadow, resident architect, Crane Wharf, Chester.

Dagenham (ESSEX).—Factory, Selinas Lane, for the Copping Tile Co., Ltd. Factory and offices, Oxlow Lane, for the Windsor Hosiery Co., Ltd. Factory, 435, Becontree Avenue, for Parrish & Summerfield.

Deal.—School, Sholden, for Borough E.C.; H. M. Barker, architect. Houses (108), near Telegraph Road, for W. & H. Properties, Ltd. Houses (200), Sholden Bank, for the First National Housing Trust.

Devonshire.—Child welfare centre, Dartmouth, with electrical work; H. V. de Courcy Hague, county architect, 97, Heavitree Road, Exeter.

Doncaster.—Extensions to girls' high school, for E.C.; Pearson & Blackwell, builders.

Dorset.—Additions to Queen Elizabeth's Grammar School, Wimborne, for C.C.; G. C. Wiles, clerk to the Governors, West Borough, Wimborne.

Dover.—Houses (50), Meadow Estate, Buckland, for E. Greenhalgh; I. F. Drury-Heath, architect. Flats, Seven Star Street; borough engineer, Maison Dieu House, Dover.

Droitwich.—Reconstruction of premises, Queen Street; Norbury House (Droitwich), Ltd.

Dumfries.—Swimming baths, Greensands; burgh surveyor.

Dunfermline.—Maternity hospital, Hospital Hill; Muirhead & Rutherford, 5, East Port.

Dursley (GLOUCESTERSHIRE).—Houses (55), King's Hill Estate (electrical work); Channing & Osmond, builders, Burnham-on-Sea.

Edinburgh.—Houses (130); city surveyor.

Essex.—Police court house, station, &c. (£21,300); J. Stuart, county architect, Chelmsford.

Exeter.—Elementary school, Ladysmith Road, for C.C.; J. Bennett, city architect, 2, Southernhay Western.

Falmouth.—Cinema (1,100 seats), Cross Row; Harris Bros., Grand Theatre.

Flint.—Houses (160); A. Snape, builder, Wirral View Estate.

Folkestone.—Houses; J. J. Clayson & Son, Ltd., builders, Lyminge. School (650 places), Morehall; director of education.

Gateshead-on-Tyne.—Alterations and additions to 52, West Street, for J. G. Smith & Co.; J. W. Corking, architect, 16, West Street. Extensions to Sheriff Hill Hospital; borough engineer.

Gillingham (KENT).—Houses (28), Hawthorn Avenue, for G. H. Ward, Ltd.

Goole.—Houses (58); borough surveyor.

Great Yarmouth.—Police stations, Middlegate Street and Gorleston; borough engineer. Extensions to factory, Cobholm; R. H. Porter, Ltd.

Greenock.—Houses, Stone Farm and Central area; R. Miller, burgh surveyor, Municipal Buildings. Library, Inverkip Road; burgh surveyor. Maternity and children's hospital, Fancy Farm; Smith, Macdonald & Crawford, solicitors, 26, Hamilton Street, Greenock.

Grimsby.—Houses (40), Nunsthorpe Housing site; H. G. Whyatt, borough surveyor, Municipal Buildings, 170, Victoria Street.

Guisborough.—Houses (500), Hutton Lowcross Estate, for the owners of the Middlesbrough Estate, Ltd., Queen's Square, Middlesbrough.

Hereford.—Houses (125), Hinton Court Estate; city engineer.

Hoddesdon (HERTFORDSHIRE).—Houses (58) and bungalows, Essex Road; William Plumpton, U.D.C. surveyor.

Holyhead.—Houses (51); U.D.C. surveyor.

Hyde.—Extensions to works and welfare centre, Aston Road; Newton Mill, Ltd.

Ipswich.—Branch clinic, Clapgate Lane; E. McLauchlan, borough surveyor, Town Hall.

Irish Free State.—(DUBLIN).—Rebuilding St. Mary's Convent Schools, King's Inns Street; William H. Byrne & Son, architects, 20, Suffolk Street, Dublin. (WATERFORD).—Extensions to Mental Hospital, including electrical drive for laundry plant; superintendent.

Lanark.—Houses (84), Ashgillhead and Waterloo; P. C. Smith, engineer, 13, Clydesdale Street, Hamilton.

Lancashire.—Extensions to Grammar School, Farnworth, for County E.C.

Leicestershire.—Modern mixed school, Earl Shilton, for County E.C.

Liverpool.—Houses and flats, Muirhead Avenue, for C.C.; director of housing, Municipal Annexe, Dale Street.

Loughborough.—Cinema, Baxter Gate; Odeon Theatres, Ltd. Extensions to Girls' High School; Governors.

Macclesfield.—Houses (150), Park Mount Estate, near Ivy Road; Gorton & Wilson, builders, Elizabeth Street.

Manchester.—Houses (36), Hazeldene Road and Milford Avenue, Moston; A. Hogg, builder, 70, Crumpsall Lane, Crumpsall. Houses (30), Kirkmanshulme Lane, Longsight, for Booth Bros.; Broughton, Atkinson & Eagle, architects, 37, Brown Street, Manchester. Branch libraries at the junction of Princess Parkway and Wythenshawe Road, Northenden; G. Noel Hill, city architect. Private patients' home, Old Christie Hospital, for the Governors of Manchester Royal Infirmary (£95,000); J. Gerrard & Sons, Ltd., builders, Pendlebury Road, Swinton. Additions to factory, Temple Street and Clare Street, Chorlton-upon-Medlock, for E. Rodgers & Co., Ltd., Grosvenor Street; H. Matthews & Sons (Builders), Ltd., 129, Stockport Road, Manchester.

Markfield (LEICESTERSHIRE).—Estate development of Briggate Hill; Groby Investments, Ltd.

Middlesbrough.—Alterations to Newlands Convent; S. H. Clarke, architect, 108, Borough Road.

Middlesex.—School (400 places), The Walk, Potter's Bar; director of education, Eccleston Square, London, S.W.

Montrose.—Buildings for R.A.F. Flying School, Maryfield; Cowiesons, Ltd., builders, St. Rollox, Glasgow.

Newcastle-on-Tyne.—Factory, Scotswood Road, for Vickers-Armstrongs, Ltd.

Northumberland.—Juvenile instruction centre, Ashington, for C.C.; W. W. Tasker, county architect, County Hall, Newcastle-on-Tyne.

Oldbury.—Swimming baths, Moat Road, Langley; Crouch, Butler and Savage, architects, 67a, New Street, Birmingham.

Oldham.—Electric lighting for Rochdale Road Institution, for P.A.C.

Oxford.—Estate development, Barracks Lane; E. Organ & Son. Development of Linkside Estate; Hinkins & Frewin, Ltd.

Penicuik.—Houses (44); J. A. Brown, burgh surveyor, Municipal Buildings.

Purley.—Swimming pool, Old Gravel Pit site; Gunton & Gunton, surveyors. Extensions to Municipal Offices, Brighton Road; Coulsdon U.D.C. surveyor.

Queenborough (KENT).—Houses (34), North Road; J. W. Smith, borough surveyor.

Rugby.—Houses (50) and bungalows, Addison Road Estate; borough surveyor. Factory, Drury Lane, for the Co-operative Wholesale Society, Ltd.; C.W.S. architect, Balloon Street, Manchester. Extensions to, including ward block, Harborough Magna Hospital, for the Joint Hospital Board; M. E. T. Wratislaw, clerk.

Runcorn.—Factory, Halton Road, for Liverpool Borax Co., Ltd., Maxwell House, 6, St. Paul Square, Liverpool, 3; Joshua Henshaw & Sons, builders, 10, Chatham Street, Liverpool.

Stockport.—Church of St. Thomas, Heaton Chapel; Bernard A. Miller, architect, Liverpool. Extensions, including ward block; Dialstone Lane Hospital; borough surveyor.

Stretford.—Canteen and extensions to Battery Charging Station, Westinghouse Road; Metropolitan-Vickers Electrical Co., Ltd.

Surrey.—Hospital, Wrythe Lane, Carshalton (£650,000), for C.C.

Tewkesbury.—Extensions to flour mill, for S. Healing & Sons, Ltd.; Collins & Godfrey, builders.

Torquay.—Houses (72), near Moor Lane; R. Ching. Houses (95), Shiphay; Premier Trust, Ltd. Thirty shops, Sherwell Lane; Cockington Trust, Ltd. Extensions to Apsley Hotel, Torwood Gardens; Mrs. E. J. Carr.

Uttoxeter.—Houses (41), Slade Lane; A. & M. Griffiths & Son, Ltd., builders, Wolverhampton.

Wakefield.—Houses (100), various sites; W. E. Massie, surveyor, Council Offices, St. John's North. Art school (£24,000); city architect.

Ventnor.—Winter gardens; A. Douglas Clare, architect, 44, Bedford Row, London, W.C.1.

West Sussex.—Senior school for boys, Shoreham; county architect, Chichester.

Whitby.—Houses (106), Gallows Close Estate; borough surveyor.

Wolston (WARWICKSHIRE).—Estate development, Stretton Lane; Holdham & Sons.

Worthing.—Showrooms, garage, dance hall, café, restaurant, and service flats (electrical work), for Brittains Garage, Ltd.; A. B. Brooker, manager.